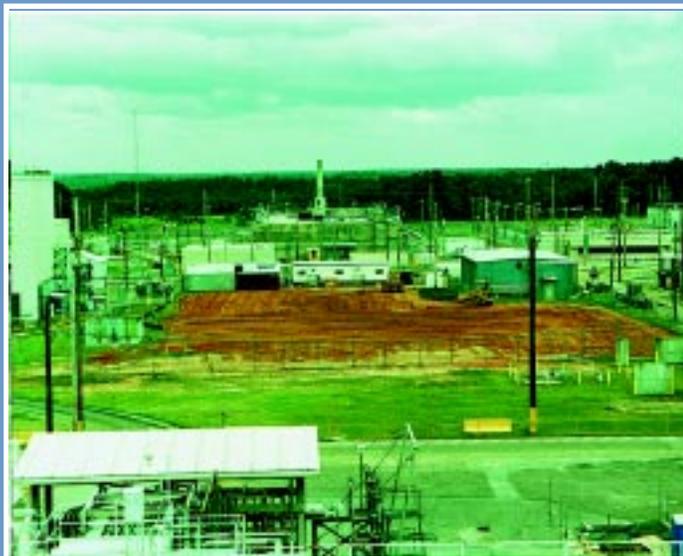
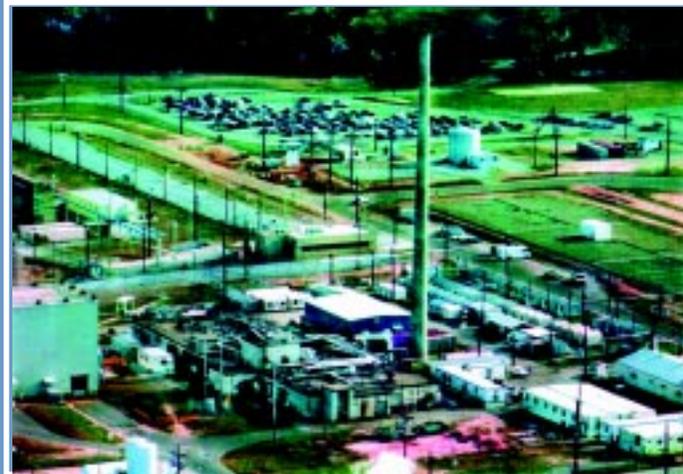




DOE PERFORMANCE INDICATORS

ENVIRONMENT, SAFETY & HEALTH



Period Ending September 1998



DOE OFFICE OF ENVIRONMENT, SAFETY AND HEALTH
DOE Office of Operating Experience Analysis
<http://tis.eh.doe.gov/oeaf/>

Photos on Cover:

Savannah River Site Tritium Production Facility. The cover photo illustrates before (top photo) and after (bottom photo) pictures of the successful decommissioning of the Savannah River Site Tritium Production Facility. This facility had been in a safe-shutdown condition since 1958 and had produced tritium for the Nation's nuclear weapons program between 1955 and 1957. Decommissioning included demolition of a 200-foot stack.

Table of Contents

Introduction	1
Performance Indicators	
Accidents/Events that have already happened	
Accidents/Events are injuries, fatalities, releases, uptakes, etc.	
1. Total Recordable Case Rate	3
2. Occupational Safety and Health Cost Index	5
3. Electrical Safety	7
4. Industrial Operations Safety	11
5. Chemical Hazard Events	15
6. Reportable Occurrences of Releases to the Environment	19
7. Cited Environmental Violations	21
8. Environmental Permit Exceedances	23
9. Radiation Dose to the Public	25
10. Worker Radiation Dose	27
11. Radiological Events	31
Precursors to accidents and near misses	
Precursors are events that resulted in significant reduction of barriers that are depended upon for safety.	
12. Near Misses and Safety Concerns	35
13. Inadequate Procedures/Procedures Not Followed	37
14. Safety System Actuations	41
15. Safety Equipment Degradation	45
ES&H Management	
ES&H Management includes work planning, training, manager and worker involvement, and regulatory compliance	
16. Environmental Compliance Milestones Met	49
17. Open DNFSB Recommendations	51
18. Price-Anderson Amendments Act Enforcement	55
Hazards level of material at risk	
Working with the program offices and sites, we hope to show how DOE is reducing hazards and vulnerabilities.	
19. Spent Nuclear Fuel and Plutonium Vulnerabilities Resolved	57
20. HEU Vulnerabilities Resolved	59
21. Waste Generation	63
22. Integrated Safety Management System Implementation Status	65
Site Highlights	67
The Secretary's Commitments to the President in EQ & ES&H (for FY98) ...	71
Appendices	
A. Relationship to DOE Strategic Plan Goals	A-1
B. Summary of Process	B-1
C. Glossary	C-1
D. Product Improvement Survey Form	D-1

This page is intentionally blank.

Introduction

New In This Report

Beginning with this report, a new section has been added to feature DOE site's approaches to ES&H performance measures. It is hoped that this will provide an opportunity for the exchange of techniques and approaches in measuring and managing ES&H performance. The focus this quarter is on the Hanford Site, which is operated by Fluor Daniel Hanford, Inc.

This report also includes a new Performance Indicator to track the status of Integrated Safety Management System (ISMS) implementation across the Complex. As ISMS processes mature, we will add measures of the effectiveness of ISMS. The Industrial Operations Safety Performance Indicator has been re-designed to better identify specific areas where industrial safety performance is improving or degrading at DOE sites. The new design breaks down events into major categories such as equipment in use, work in progress, and utility incursions. We welcome feedback on the benefit of this new approach or to improve this important performance indicator.

Trends

In reviewing overall trends for the past two years, the following general observations can be made: three of the indicators demonstrated favorable trends, five demonstrated unfavorable trends, and thirteen indicators demonstrated no significant trends.

Indicators showing favorable trends are as follows:

- **Total Recordable Case Rate** - The DOE-wide TRC rate continued to remain below the DOE average of 3.8. The reduction in TRC for lump-sum construction activities is a major contributor to this improving trend. (PI-1)
- **Cost Index** - The DOE-wide occupational safety and health cost index continued to decrease below its five-year average cost index. (PI-2)
- **Radiation Dose to the Public** - The total collective radiation dose to the Public continues to decrease from a high value in 1993 of 98.4 Person-Rem to the current value of 47.4 Person-Rem. (PI-9)

Several indicators show either a potential degradation in performance or the need for a focused effort to reverse the trend:

- **Industrial Operations Safety** – We are observing a significant increase in industrial operations safety events over the past two quarters. The events were primarily associated with activities involving material handling, excavation/trenching, and drilling/boring. (PI-4)
- **Chemical Hazards** - Since 97Q1, there has been an overall increasing trend in the number of chemical hazard events. The July 1998 fatality at the Idaho National Engineering and Environmental Laboratory due to CO₂ fire suppression discharge is included in these numbers. (PI-5)
- **Environmental Releases** - In 98Q3, the previously favorable trend that existed for the past 17 quarters was reversed. In 98Q3, the number of environmental releases almost doubled the previous quarter's (98Q2) rate, largely due to increases in the number of untreated or contaminated water releases to the environment. (PI-6)
- **Near Misses and Safety Concerns** – This indicator is exhibiting a cyclical four-quarter trend starting low in the fourth quarter and ending high in the third quarter. A focused effort in the latter quarters of the calendar year may aid in reducing the number of these potentially life-threatening events. Of note, electrical and industrial activities were responsible for the majority of the near misses and safety concerns events in 98Q3. (PI-12)

- **Environmental Compliance Milestones Met** – The percentage of milestones completed for the past five quarters continues to remain below that of previous years. In 98Q2, only 64 percent of DOE's environmental commitments were met. (PI-16)

This report and additional analytical tools, techniques, and data can be found at our Internet Web site. Please visit us at <http://tis.eh.doe.gov/oeaf>.



Tom Rollow, PE
Director
Office of Operating Experience Analysis

For further information, contact:

Office of Operating Experience Analysis
EH-33/270CC/GTN
U.S. Department of Energy
Washington, DC 20585

Phone: 301-903-8371
e-mail: richard.day@eh.doe.gov

[On the Web](#)

[Contact for Additional Information](#)

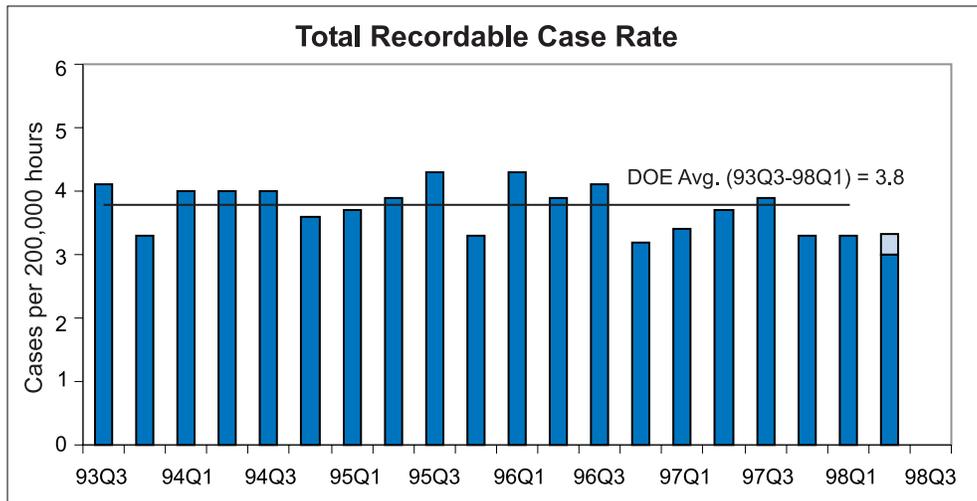
Indicator

1. Total Recordable Case Rate

Definition

Work-related death, injury or illness, which resulted in loss of consciousness, restriction of work or motion, transfer to another job, or required medical treatment beyond first aid.

Total Recordable Case (TRC) Rate is the number of total recordable cases per 200,000 hours worked. This rate does not include Federal employee recordable cases.



Source: DOE Data—Computerized Accident/Incident Reporting System.

Note: Extended portion at the top of 98Q2 depicts the estimated increase due to late reporting.

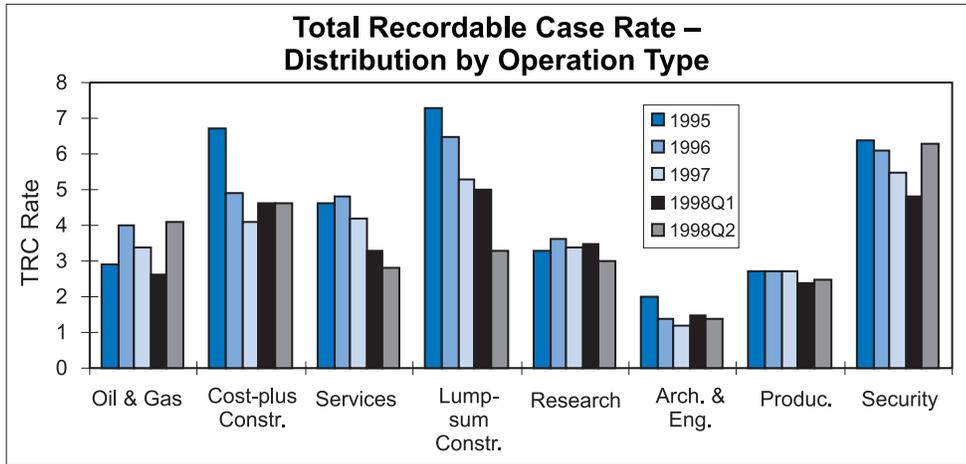
Key Observations

- While the 98Q2 TRC rate (cases per 200,000 hours worked) appears to be at its lowest quarterly value (3.0) in the past 5-years (based on actual numbers), it is estimated that the 98Q2 rate will increase slightly over the next two quarters due to late reporting.
- In 98Q2, the estimated 1050 total recordable cases will represent a 12.5% decrease in the number of cases reported when compared to the second quarter of 1997. For the same time period, there was a 3% decrease in the number of work hours.
- About 44% of the total recordable cases were lost workday cases; nonfatal cases without lost workdays accounted for the remaining 56%. Based on actual numbers, the 98Q2 lost workday case rate was 1.3 per 200,000 hours, the lowest rate recorded for any quarter in the previous 5-year period. This rate is expected to increase slightly in the next two quarters, due to late reporting.
 - In November, Rocky Mountain Remediation Services (RMRS), a Rocky Flats principle subcontractor, announced a record low lost workday case rate of 0.26 for Fiscal Year 1998. RMRS attributed this new low to management walk throughs, efficient problem resolution, and good communication with union leadership.

Distribution by Operation Type

- TRC rates for 98Q2 ranged from 6.3 for employees performing work activities in security organizations, to 1.4 for employees working in architectural and engineering operations. Oil and gas operations increased from 2.6 for 98Q1 to 4.1 this quarter.

Additional Analysis



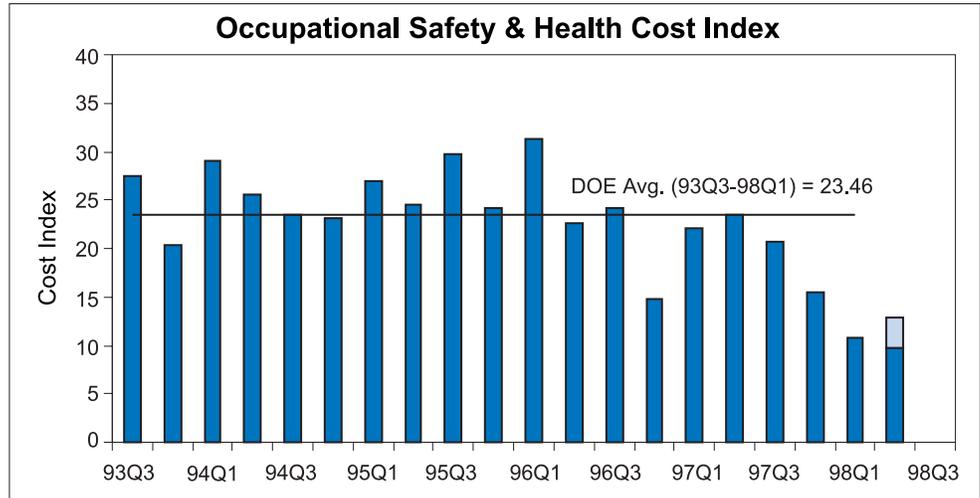
- TRC rates for security operations continue to exceed the DOE 5-year average TRC rate of 3.8.
- The lump-sum construction component (major contributor) to the TRC has continuously decreased to 60 percent of its 1994 value. This quarter is the first time lump-sum construction quarterly TRC rate has dropped below the DOE 5-year average TRC rate of 3.8.

Indicator

2. Occupational Safety and Health Cost Index

Definition

Represents the approximate amount of dollars lost (indirect and direct) per 100 hours worked for all injuries/illnesses using the formula specified in Appendix C, Glossary. The coefficients used in the Cost Index formula are weighing factors derived from a study of the direct and indirect dollar costs of injuries. The index is not commonly used in private industry. DOE sites use this index to measure their progress in improving worker safety and health performance.



Source: Computerized Accident/Incident Reporting System.

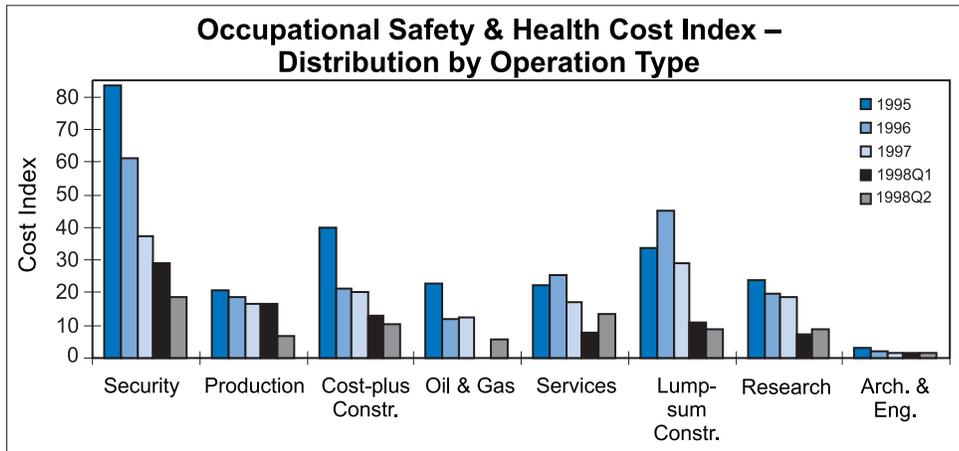
Note: Extended portion at the top of 98Q2 depicts the estimated increase due to revisions in lost worktime and late reporting.

Key Observations

- The estimated 98Q2 cost index for DOE contractors is 12.94. When compared to the actual 97Q2 cost index of 23.49, the estimated 98Q2 cost index represents a decrease of 45%. In 97Q2, DOE contractors experienced one fatality. No fatalities occurred during 98Q2. This component of the cost index and variations in other components all contribute to the lower estimated cost index for 98Q2.
- Analysis of the components that comprise the Cost Index show that the number of days away from work (WDL - highest contributor to the Cost Index) has significantly decreased (more than 80%) since 96Q1 and has substantially contributed to the decrease in the Cost Index.

Distribution by Operation Type

Additional Analysis



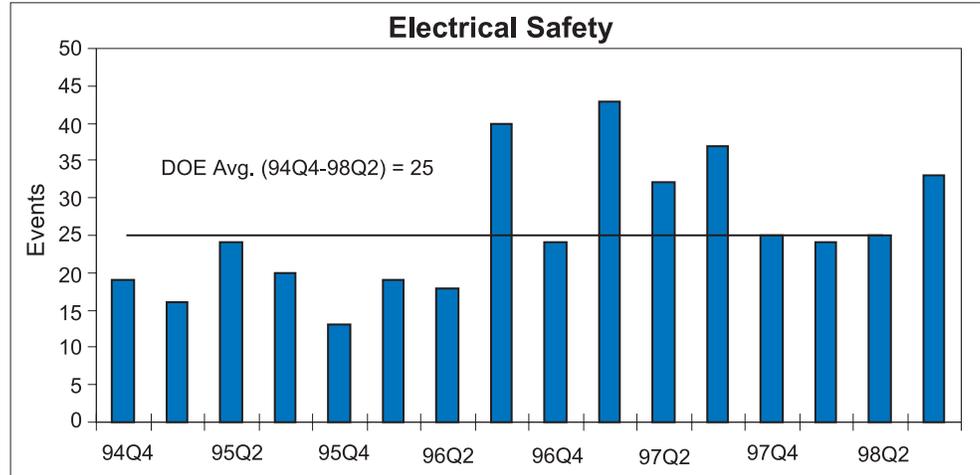
- Operations involving lump sum construction and security activities reported the highest Index for 1997: 29.14 and 37.11, respectively.
- The DOE five year average cost index is 23.89. The actual 98Q2 cost indices for security and service operations were the highest of the identified operations. The increase in the services cost index from 98Q1 is directly related to an increase in injury-related transfers and terminations during this period.

Indicator

3. Electrical Safety

Definition

The number of events involving worker contact or the potential for contact with electrically energized equipment. These events are reportable under DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*.



Source: Review of Occurrence Reports by Department Analysts.

Key Observations

- After a notable decline from 97Q1 to 97Q4 (from 45 to 23 events) and then holding steady over the next three quarters (97Q4 to 98Q2: average of 24.7 events per quarter), the number of electrical safety events increased to 33 in 98Q3. The data indicates that the baseline for electrical safety events shifted in 96Q3 and has held constant at the higher level. Given this, it appears that electrical safety performance has not changed significantly since 96Q3.
- The relative severity of the electrical safety events decreased from the previous quarter, continuing a trend that was observed last quarter.

Additional Analysis

The following table shows the average number and rate of events (normalized to work-hours) for the periods from 94Q4 to 96Q2 and from 96Q3 (when the baseline would have shifted) to the current quarter.

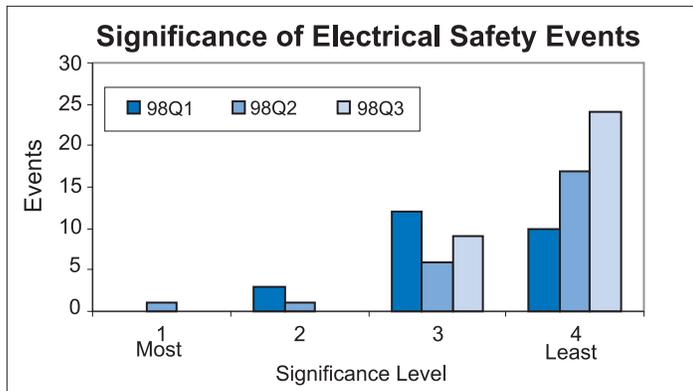
Period	Avg. Events	Avg. Events/200,000 Hrs
94Q4 - 96Q2	18.4	0.063
96Q3 - 98Q3	31.4	0.128*

*98Q3 total work-hour data are not available to calculate event rate at this time; thus, 98Q3 data was not used in this calculation.

- The table shows that the average rate of events since 96Q3, normalized to 200,000 work-hours, is nearly twice that for the period before 96Q3.
- Out of the 33 events this quarter, 10 involved procedure problems. These problems included lack of or inadequate procedures, failure to use procedures, and inappropriate use of procedures.
- Four events in 98Q3 involved problems with lockout/tagouts (LO/TO). Two of these events involved inadequate lockouts. The other two involved loss of LO/TO configuration control. In these two events, an adequate LO/TO was initially established and then altered before or during the work, resulting in exposure to energized equipment.

Significance of Events

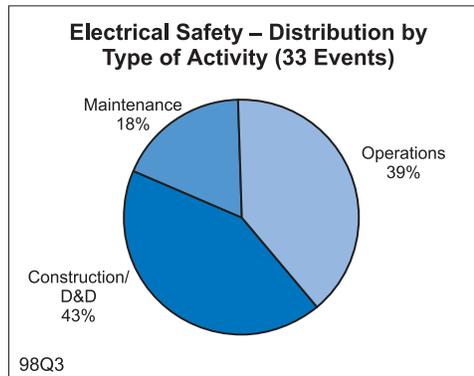
Significance of electrical safety events is ranked in accordance with Table 1, *EH-33 Performance Indicator Significance Criteria*, which is included in Appendix B-3 of this report. Significance ranking of electrical safety events started in 98Q1. The following graph shows number of events for each significance level for the past three quarters.



- The last edition of this report stated that, with the exception of a single Level 1 event, electrical safety events that occurred in 98Q2 were less significant than those occurring in the previous quarter. This trend continues into 98Q3. The number of Level 4 and Level 3 events increased over 98Q2 and there were no Level 1 or Level 2 events in 98Q3.

Distribution by Activity

- As in 98Q2, nearly half the events (43%) occurred during construction, decontamination, or decommissioning. Thirty-nine percent occurred during normal operations and only 18% occurred during maintenance activities.

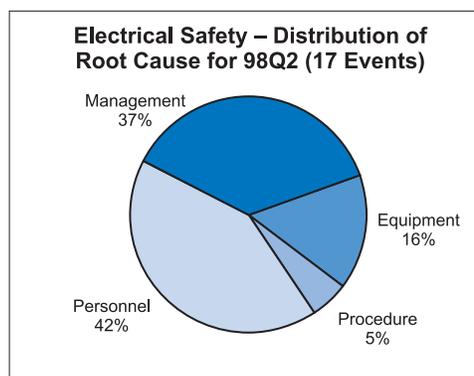


Distribution by Location

- As in past quarters, events were spread across many sites, with no site reporting more than 4 events. Thirteen of the 17 sites reporting events reported only one or two events.

Distribution by Root Cause*

- The distribution of 98Q2 electrical safety events by root cause is similar to the previous four quarters, with about 79% of events caused by either management problems or personnel error.



*Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

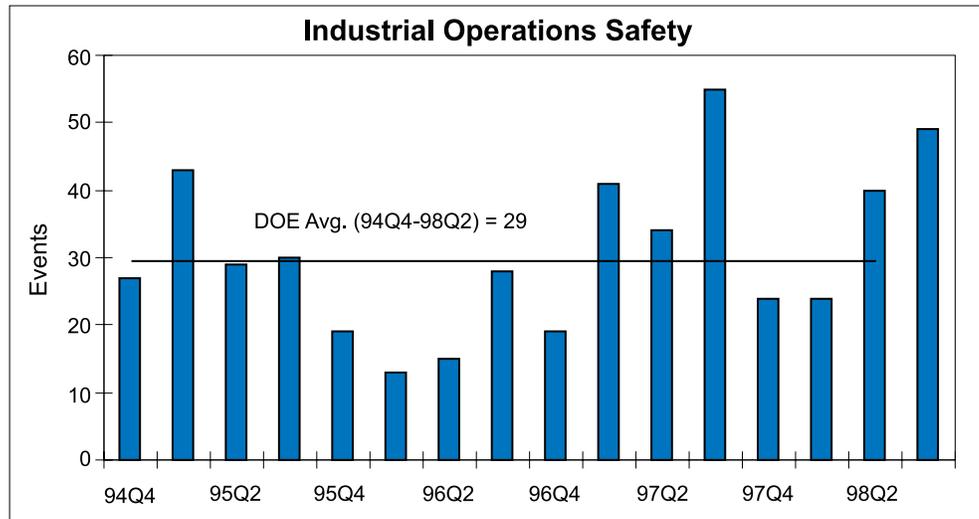
This page intentionally left blank.

Indicator

4. Industrial Operations Safety

Definition

Number of operations-related events involving construction equipment, forklift operations, machining operations, hoisting, rigging, or excavation reportable under DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*.



Source: Review of Occurrence Reports by Department Analysts.

Key Observations

- The second highest total of industrial operations safety related events occurred this quarter (49), exceeding the DOE average by 20 events.
- This quarter, 3 events (6%) resulted in injury compared to 7 events (18%) last quarter.
- 22 (45%) industrial operations safety events this quarter were related to utility incursions (underground, structural penetration, or overhead).

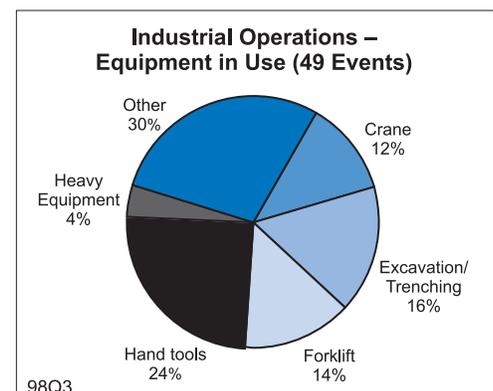
Additional Analysis

The following analysis comprises three sections: "Equipment in Use", "Work in Progress" and "Utility Incursions." The "Utility Incursion" section is a new section and addresses only the number of events potentially or actually impacting utilities (underground, structural penetration, or overhead).

Equipment In Use

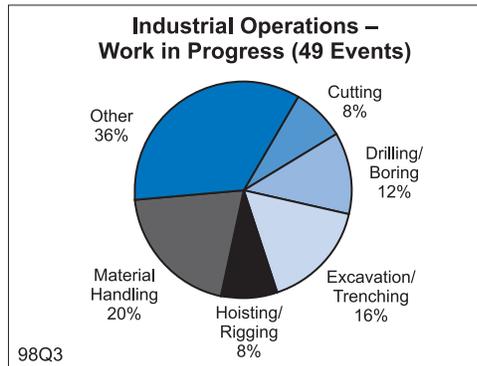
This analysis only addresses equipment (forklifts, backhoes, cranes, hand tools, etc.) that was reported as being in use at the time an event occurred.

- As shown, 24% of the events this quarter were related to the use of hand tools. Until now, this category has not been among the top contributors and is being reported separately for the first time.



Work In Progress

- This analysis addresses the type of work activity being performed at the time an event occurred.



Utility Incursions

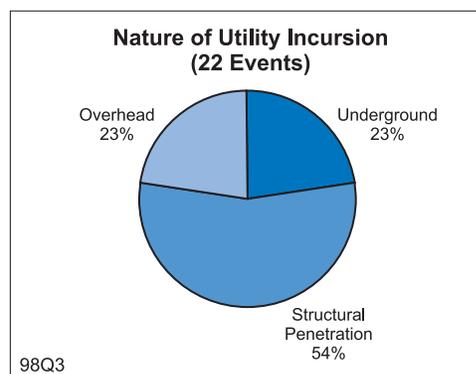
- In December 1996, DOE issued Safety Notice (96-06) to draw attention to the recurring events involving the “unexpected discovery of underground utilities during excavation or trenching operations” at DOE facilities. The Safety Notice recommended the implementation of a comprehensive “underground” utility detection and marking program at each DOE facility. The following analysis, however, is intended to focus on the need for such a program to address not only underground incursions, but structural penetration and overhead incursions as well.
- In 98Q3, 45% (22 events) of the industrial operations safety events were related to utility incursions, compared to 30% for 98Q2, and 50% for 98Q1.

Lessons learned from previous structural penetration events can be found in Lessons Learned report 98Q2 (DOE/EH-0564), Penetrating Hidden Utilities, released in December 1998. The document, in Adobe pdf format, can be downloaded at website address:

http://tis.eh.doe.gov/web/oeaf/lessons_learned/reports

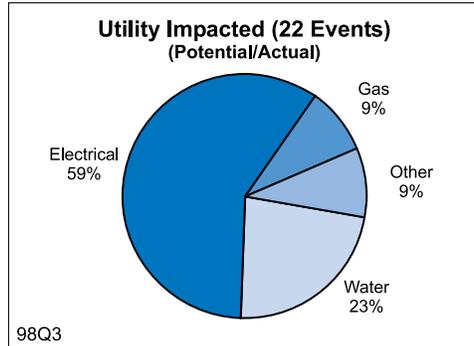
Nature of Utility Incursion

- For 98Q3, 9 of 12 structural penetrations (walls, floors or ceilings) involved the use of hand tools.
- For the previous quarter, there were 12 utility incursion events with the following *initial locator activities* recorded:
 - In 50% of these events, the occurrence report identified that drawings were reviewed, but in only one case was identification made.
 - In 75% of the utility cases, no detection activities were reported to have been performed. In 3 cases, detection activities were performed, but subsurface utilities were not detected.



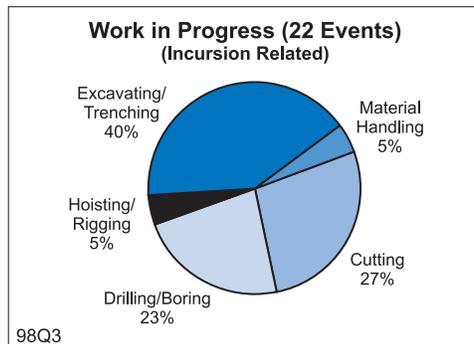
Utility Impacted (Potential / Actual)

- In 98Q3, 5 water lines were ruptured, 2 of which supplied water to Fire Protection Sprinkler Systems.
- In 98Q3, 13 of the 22 utility incursions involved electrical utilities, 6 of which were energized. In 98Q2, 10 of the 12 incursion events involved electrical conductors, 9 of which were energized.
- In 98Q3, 2 active gas lines were ruptured.



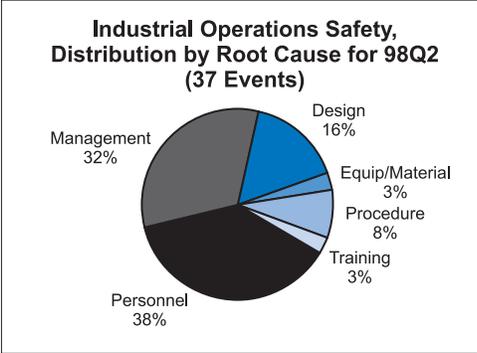
Work in Progress (Incursion Related)

- Excavation/trenching operations were associated with 40% of the utility incursion events in 98Q3, compared to 58% last quarter.
- Cutting and Drilling/Boring accounted for 60% of the incursions in 98Q3, compared to 25% last quarter.



Distribution by Root Cause*

- Of the 40 events recorded for 98Q2, 37 had root causes established.
- “Inattention to Detail” was the most often cited cause for the “Personnel Error” category, “Work Organization/Planning Deficiency” was the most often cited cause for “Management Problems”, and “Inadequate or Defective Design” was the most often cited cause for “Design Problems”.
- For those events associated with utility incursions, “Work Organization/Planning Deficiency” and “Procedure Not Used/Used Incorrectly” were the most often cited cause for the 12 events.



*Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

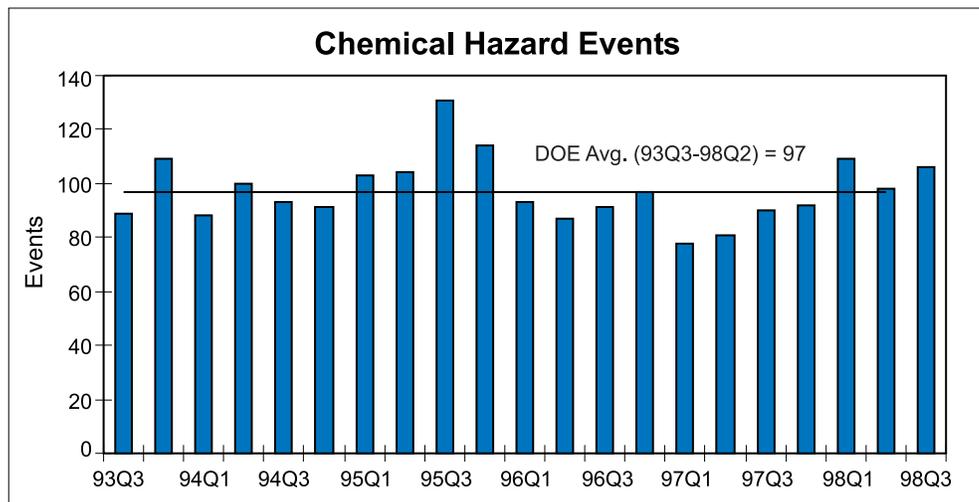
Indicator

5. Chemical Hazard Events

Definition

Number of events reportable under DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*, that are gathered by a word search for specific chemical names. The selected events are reviewed and screened for conditions meeting one of the following categories:

- Class 1 - An injury or exposure requiring hospital treatment or confirmed, severe environmental effect.
- Class 2 - Minor injury (first aid) or exposure, or minor environmental damage.
- Class 3 - Potential precursors to the occurrences in Class 1 or 2.
- Class 4 - Minor occurrences such as leaks, spills, or releases that are significant by the frequency, but not by the consequences.



Source: Office of Field Support, EH-53, *Chemical Safety Concerns: A Quarterly Review of ORPS* (draft, posted on the Web at <http://www.dne.bnl.gov/etd/csc/>)

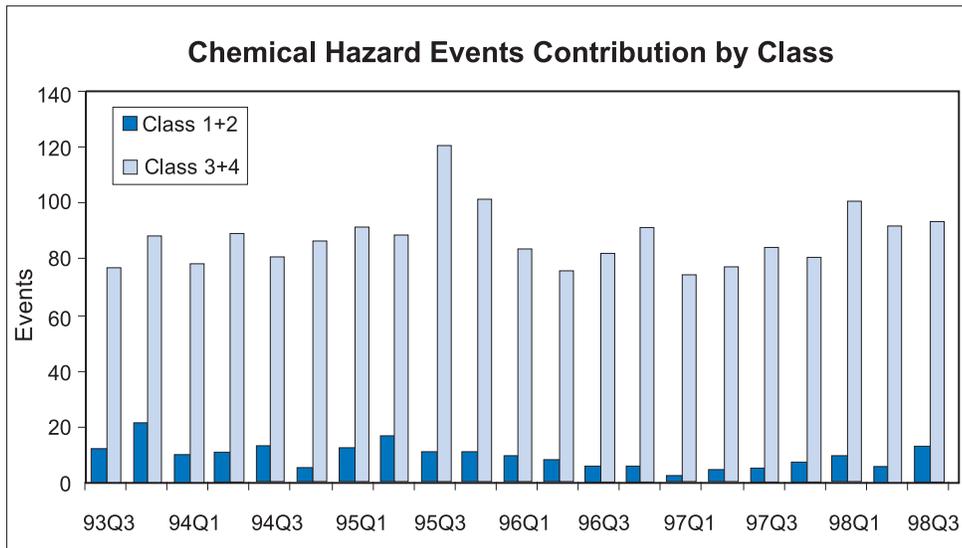
Key Observations

- In 98Q3 there was an 8% increase in the number of chemical hazard events (106) over 98Q2. This is the third consecutive quarter in which the number of events have exceeded the five year average of 97. Since 97Q1, there has been an overall increasing trend in the number of chemical hazard events.
- Class 1 and 2 events show an increasing trend over the last six quarters. There were 13 Class 1 and 2 events for 98Q3, the third highest total since 93Q4; 12 of the 13 events were Class 2.
- In 98Q3, one Class 1 event involved a fatality and three serious injuries. This accident occurred at the Idaho National Engineering and Environmental Laboratory when fire retardant carbon dioxide (CO₂) was accidentally released during routine maintenance operations.

Characterization of Chemical Hazard Events

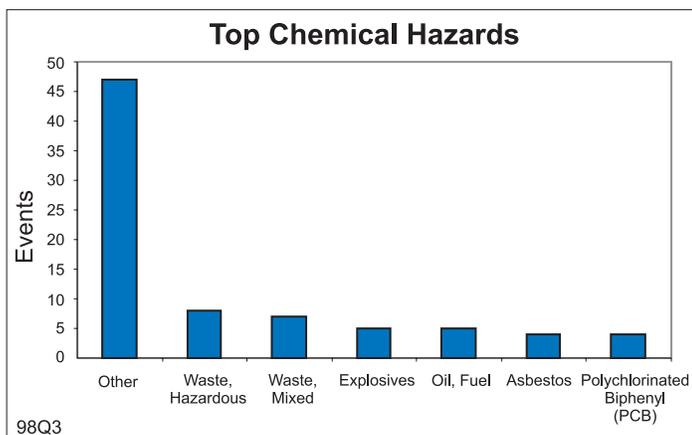
- There were 12 Class 2 events this quarter, up from 6 in 98Q2. Some of the more noteworthy events are:
 - Three Class 2 events involved overpressurized storage containers. In two cases, lids blew off of the containers as they were being opened to perform sampling for waste characterization.
 - One Class 2 event resulted in three workers suffering varying degrees of burn when acetone vapor ignited during a cleaning operation.
 - At Hanford, a Class 2 event involved the inadvertent discharge of a Halon system during maintenance functional test activities. While the event was similar to the one at INEEL that resulted in one fatality and several injuries, this event resulted in five personnel being successfully evacuated.

Additional Analysis



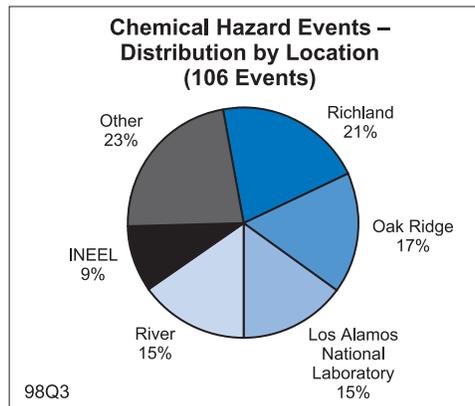
Distribution by Chemicals Involved

- In 98Q3, there was not one category of chemical events or individual chemicals that dominated the distribution.



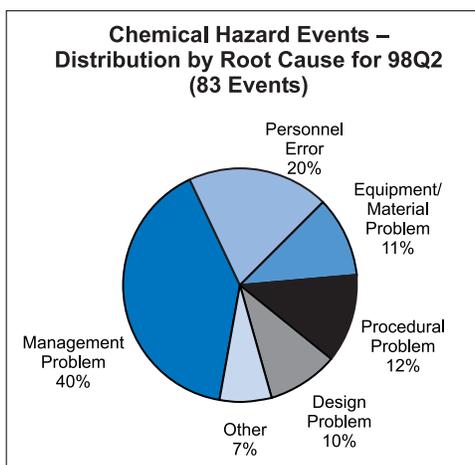
Distribution by Location

- Of the 22 events reported at Richland, one was a class 2 event with the rest class 3 events. The class 2 event involved an inadvertent discharge of a Halon system during a maintenance functional test.
- The 18 events at Oak Ridge involved a variety of hazards including, uranium, hydrogen fluoride, Halon, and PCBs among others.



Distribution by Root Cause*

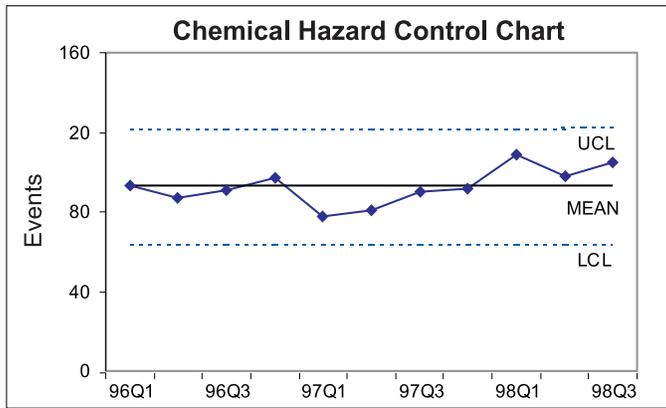
- Of the 98 chemical hazard related events reported in 98Q2, 83 had root causes assigned. Of these, the top 2 categories were Management Problems (33 events) and Personnel Error (16 events). Procedure and Material/Equipment problems accounted for 10 and 9 events respectively.
 - Of the management problems cited, Inadequate Administrative Control was cited the most (13), with Work Organization/Planning Deficiency, and Policy Not Adequately Defined, Disseminated, or Enforced with 6 each.
 - In the Personnel Error category, the most frequently cited was Procedure Not Used or Used Incorrectly; Inattention to Detail was second.
 - Of the Equipment/Material Problems cited, Defective or Failed Part was the most often cited.



*Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

Statistical Process Control (SPC) Analysis

- The processes in place to prevent chemical hazard events remains within statistical process control.

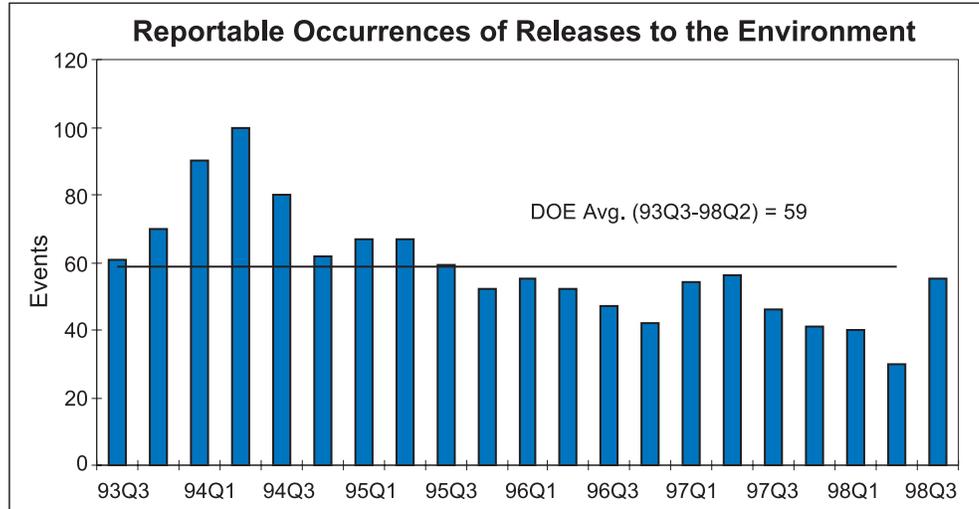


Indicator

6. Reportable Occurrences of Releases to the Environment

Definition

Releases of radionuclides, hazardous substances, or regulated pollutants that are reportable to federal, state, or local agencies.



Source: Review of Occurrence Reports by Department Analysts.

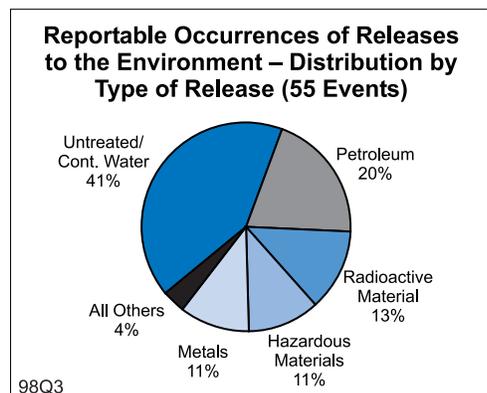
Key Observations

- In 98Q3, the Department experienced a substantial increase (over 80%) in the number of reported release events when compared to the previous quarter and a similar, though less extreme, increase (40%) over the average of the previous 4 quarters. This increase is largely due to the increase in the number of untreated or contaminated water releases.

Additional Analysis

Distribution by Type of Release

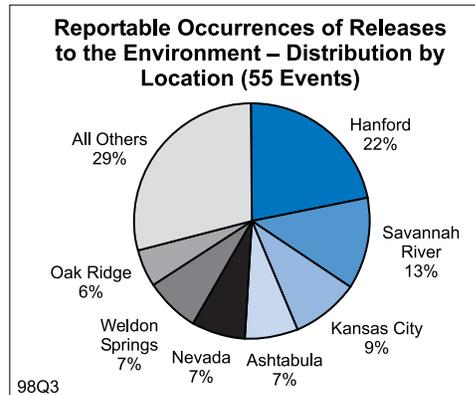
- Unlike last quarter, untreated/contaminated water releases represented the single largest type of release in 98Q3. Of these 23 events, over half (12 events) involved NPDES permit exceedances for a variety of parameters including fecal coliform, suspended solids, dissolved oxygen and nitrogen. The next largest contributor to these water releases was the release of sewage/untreated water with 6 events.
- Last quarter's largest contributor, petroleum products, was also a major contributor in 98Q3. In fact, though the percentage of these release events dropped (from 30% in 98Q2 to 20% this quarter) the actual number of these release events rose slightly from 9 to 11. The majority of these events were related to leaking diesel/fuel oil



from sources such as a punctured diesel generator fuel tank, leaking boiler fuel line, a punctured truck gas tank, and other similar leaks.

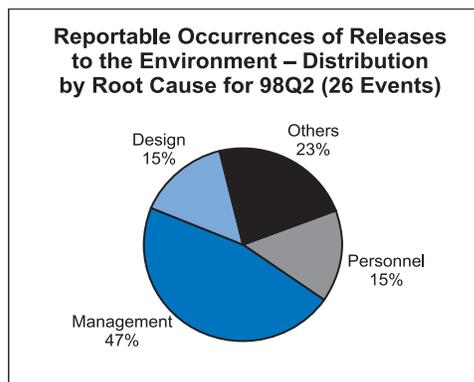
Distribution by Location

- This quarter’s primary contributor, Hanford, has been among the top contributors consistently over the last 20 quarters. Last quarter’s primary contributors, Los Alamos and the Mound Plant were replaced with Kansas City and Savannah River as the other top 2 contributors in 98Q3.
- 2 of the 3 primary contributors this quarter had significantly more events than their 20 quarter average. In the case of Hanford, there were 12 events, 3 times the 20-quarter average of 4. This increase was largely due to increases in releases reported at Hanford’s Analytical Laboratory 222 and the Plutonium Finishing Plant. In the case of Kansas City, this quarter’s 5 events exceeded the 20 quarter average of 1 event, all the result of groundwater releases. Savannah River experienced 7 events, only slightly above the 20-quarter average of 5.
- The Mound Plant, one of last quarter’s top 2 contributors, had no reported events in 98Q3. The other top contributor from last quarter, Oak Ridge experienced 3 events in 98Q3, all at the X-10 Plant.



Distribution by Root Cause*

- Of the 30 events reported in 98Q2, 26 had root causes established. Although their relative contribution changed, the aggregate number of management related and personnel related events remained nearly the same compared to 98Q1. The number of design related events dropped from 9 in 98Q1 to 4 in 98Q2 and the number of equipment/material related events dropped from 8 in 98Q1 to 1 in 98Q2.
- Though the number of management related events remained nearly the same as in 98Q1, a favorable trend exists going back through the last 20 quarters. The majority of these management related events in 98Q2 were related to inadequate administrative controls identifying a deficiency in the controls in place to administer and direct activities.
- The majority of personnel related events were the result of “Inattention to Detail” while the majority of design related events were attributed to “Inadequate or Defective Design.”



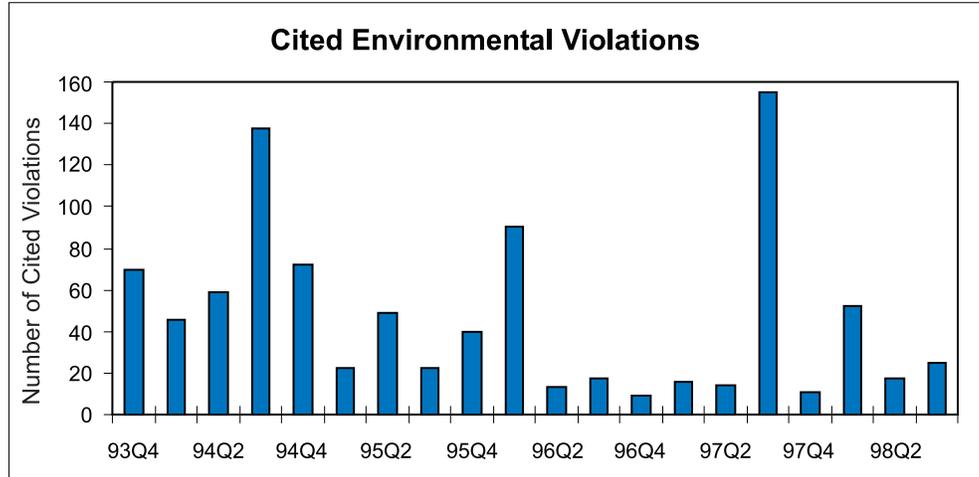
*Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

Indicator

7. Cited Environmental Violations

Definition

Number of environmental violations cited in enforcement actions, e.g., Notices of Violations (NOVs), by regulators at DOE facilities. (An NOV may cite one or multiple violations).



Source: EH-41 Compliance Database.

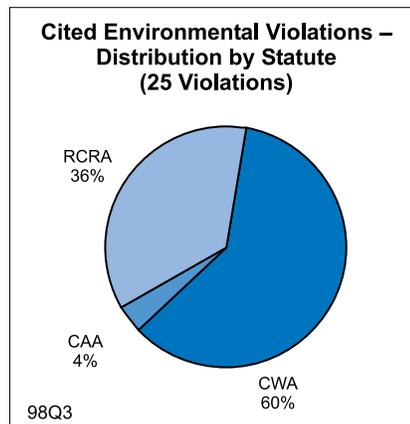
Key Observations

- Twenty-five violations, in seven Notices of Violation, were cited in 98Q3.
- Thirteen water discharge permit exceedances at Savannah River, cited in a single NOV, account for more than half of the cited violations.
- A single large penalty was assessed in the third quarter, in connection with missed milestones in the Rocky Flats cleanup effort.

Additional Analysis

Violations by Statute

- Clean Water Act violations predominate, with RCRA accounting for nearly all the rest. Three Notices of Violation were issued under the Clean Water Act and three under RCRA.
- A single Notice of Violation at the Savannah River Site cited thirteen separate violations of water quality discharge permit standards.

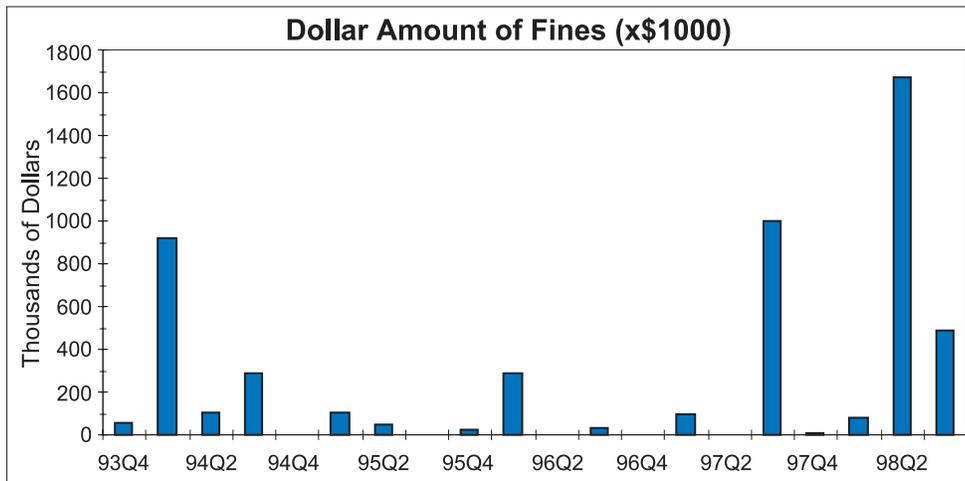


RCRA = Resource Conservation & Recovery Act (and related state laws)

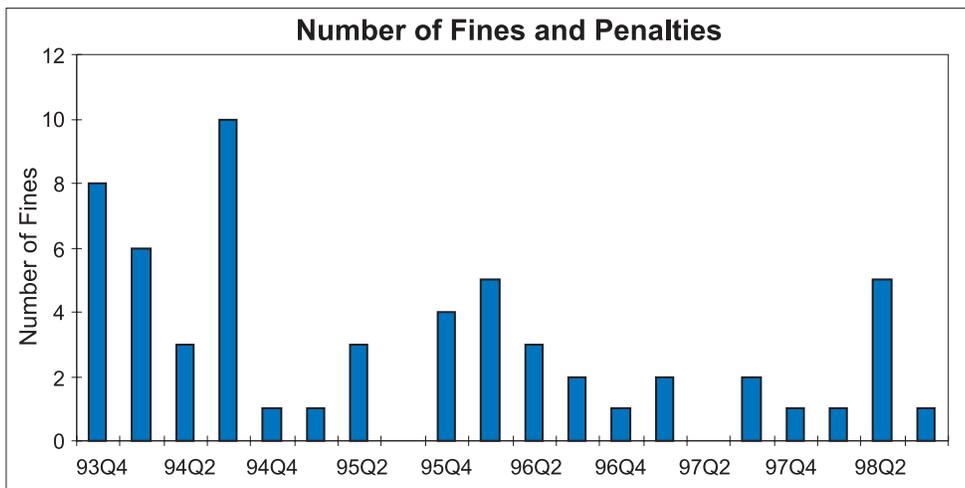
CAA = Clean Air Act (and related state laws)

CWA = Clean Water Act (and related state laws)

Fines



- A penalty of \$490,000 was assessed at Rocky Flats in a Compliance Order related to delays in draining plutonium and nitric acid tanks. \$100,000 will be paid to the State of Colorado; the remaining \$390,000 will be applied to Rocky Flats programs involving accelerated repackaging and off-site shipment of waste materials.



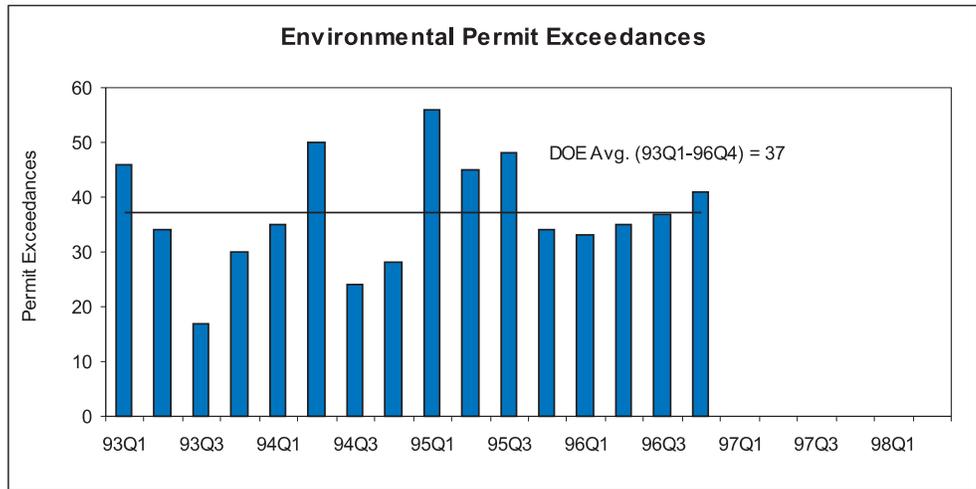
Indicator

8. Environmental Permit Exceedances

Definition

Exceedance of release levels specified in air and water permits during the quarter.

No change to this section since last report.



Source: Annual Site Environmental Reports, additional site data.

Key Observations

- After an increase in the number of permit exceedances each year from 1993-1995, the exceedances for 1996 showed a 20 percent decrease from those tabulated in 1995 (146 in 1996 versus 183 in 1995).
- In 1996, as in previous years, the vast majority (96.5 percent) of exceedances were due to violations of permits under the Clean Water Act for discharge to surface waters.

Additional Analysis

- Since 1993, there has been a trend in permit exceedances becoming more evenly distributed across more sites instead of being concentrated at a few sites.
- Most exceedances (96.5 percent) continued to occur under National or State Pollution Discharge Elimination System Permits. These permits are mandated by the Clean Water Act to protect surface waters by limiting effluent discharges to receiving streams, reservoirs, ponds, etc. Other permit exceedances occurred under Clean Air Act permits (1.4 percent) and the Safe Drinking Water Act/Underground Injection Control permits (2.1 percent).
- Twenty of the 51 sites (39 percent) that reported for 1996 indicated that no permit exceedances occurred at their sites.

Note: The number of exceedances—and the number of potential exceedances—was a function of the permit-specific parameters, number of outfalls at a facility, reporting frequency requirements, and the timing of renewal or changes to the NPDES/SPDES permit. In addition, changes in temperature, sunlight, and precipitation events all contributed to permit exceedances of non-toxic reporting parameters such as Biological Oxygen Demand, pH, and Total Suspended Solids.

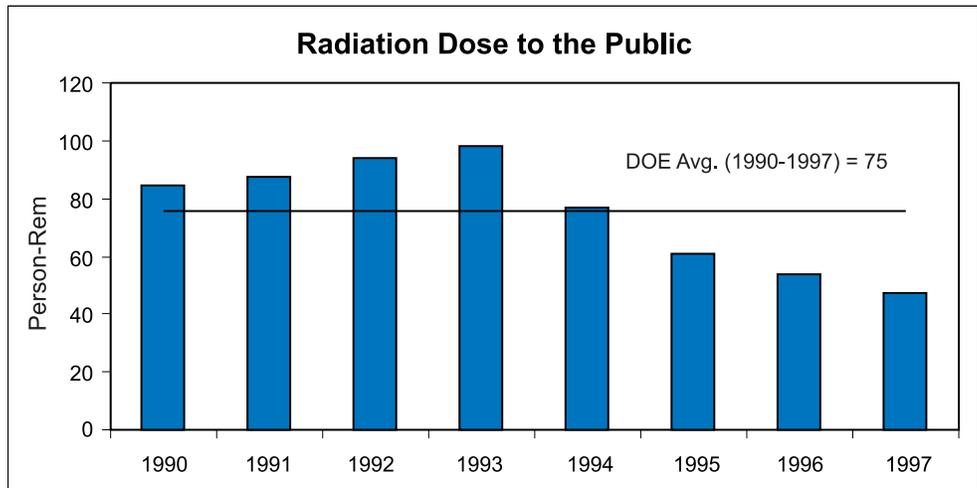
This page intentionally left blank.

Indicator

9. Radiation Dose to the Public

Definition

Total collective radiation dose (person-rem) to the public within 50 miles of DOE facilities due to radionuclide airborne releases. ("Collective radiation dose" is the sum of the effective dose equivalent to all off-site people within a 50-mile radius of a DOE facility over a calendar year.)



Source: Annual reports to EPA; EH-41 data tabulation.

Key Observations

- Total collective radiation dose to the public from DOE sources was very low compared to the public dose from natural background radiation. The total collective radiation dose to the public around DOE sites from air releases was one ten-thousandth of the dose received by the same population from natural background radiation.
- Total collective radiation dose to the public in 1997 decreased 12 percent (6.4 person-rem) from the previous year. The decrease was primarily associated with a decrease at Rocky Flats (10 person-rem.) This was partially offset by an increase at Fernald Environmental Management Project (4 person-rem).
- Estimated collective dose has steadily decreased over the last five years. Estimated collective dose for 1997 is about one-half of the value from five years ago.

Additional Analysis

- About 70% of the estimated collective dose for 1997 occurred at four sites: Oak Ridge, Fernald, Princeton Plasma Physics Laboratory, and Savannah River Site. This is consistent with 1996.
- A 10 person-rem decrease was reported at Rocky Flats; from 1996 to 1997; a return to previously low values. High values were reported in 1996 due to decontamination and decommissioning work, particularly excavations at the T-3 and T-4 trenches.
- A 4 person-rem increase was reported at Fernald; this represents a 70% increase over 1996. The increase at Fernald is due to the start of active remediation, particularly soil excavation; these activities are expected to continue for the next few years.

This page intentionally left blank.

Indicator

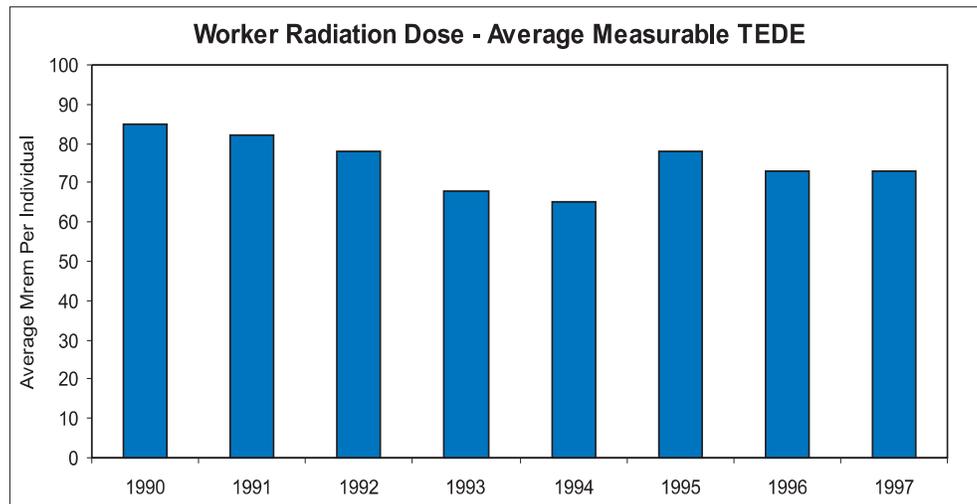
10. Worker Radiation Dose

Definition

Average measurable dose to DOE workers, calculated by dividing the collective total effective dose equivalent (TEDE) by the number of individuals with measurable dose.

TEDE is determined by combining both internal and external contributions to an individual's occupational exposure. The number of individuals receiving measurable dose is used as an indicator of the exposed work force size.

No change to this section since last report.



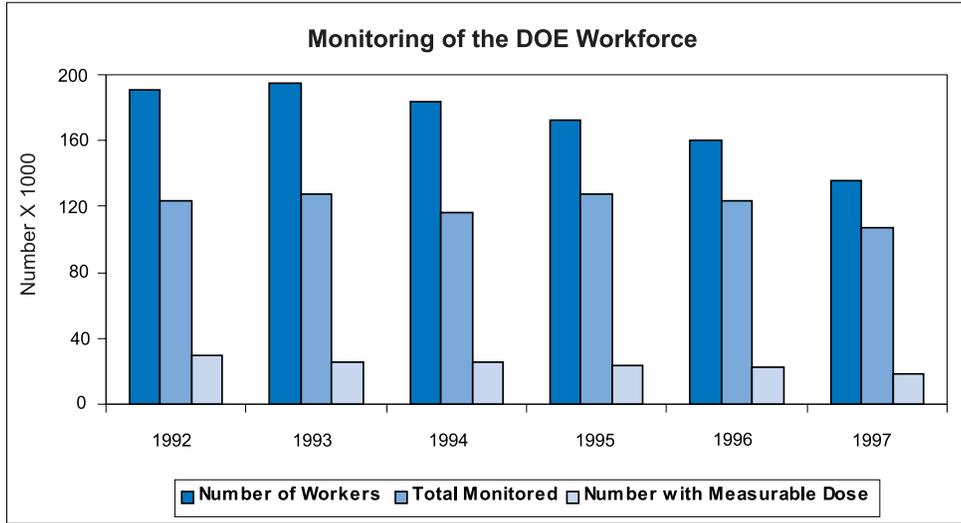
Source: U.S. Department of Energy, DOE/EH-52 and DOE Occupational Radiation Exposure Report.

Key Observations

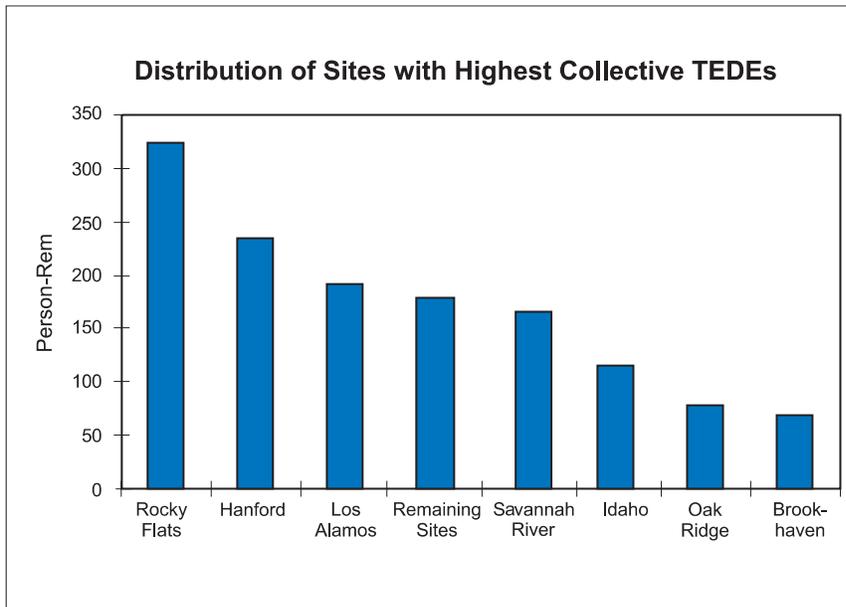
- Between 1996 and 1997, the DOE collective total effective dose equivalent decreased by 18 percent due to decreased doses at 5 of the 7 dose sites with the highest radiation dose. Further, transfer of regulatory authority of the Paducah and Portsmouth Gaseous Diffusion Plants to the Nuclear Regulatory Commission account for 1.8 of those percentage points, as that dose is no longer reported to the DOE.
- There was one exposure (estimated at 15-30 rem; estimated doses are not included in the 1997 collective TEDE) over the DOE five-rem TEDE limit associated with an intake of Curium-244 at Lawrence Livermore National Laboratory. The identified root causes were management's failure to adequately analyze, control, and manage a hazardous waste treatment operation (HEPA filter shredding). There were three additional exposures that exceeded the DOE Administrative Control Limit of two rem but did not exceed the five-rem limit.
- There is a statistically significant increase in the mean of extremity doses each year since 1994 (60%).
- The dose associated with neutron exposure continues to decrease primarily due to reduction in plutonium handling activities at Los Alamos National Laboratory (41% of the neutron dose over the past 3 years).

Additional Analysis

- Additional information concerning exposure received by individuals associated with DOE activities is included in the DOE/EH-0564, *Occupational Radiation Exposure Report 1997* (on line at <http://rems.eh.doe.gov/annual.htm>).

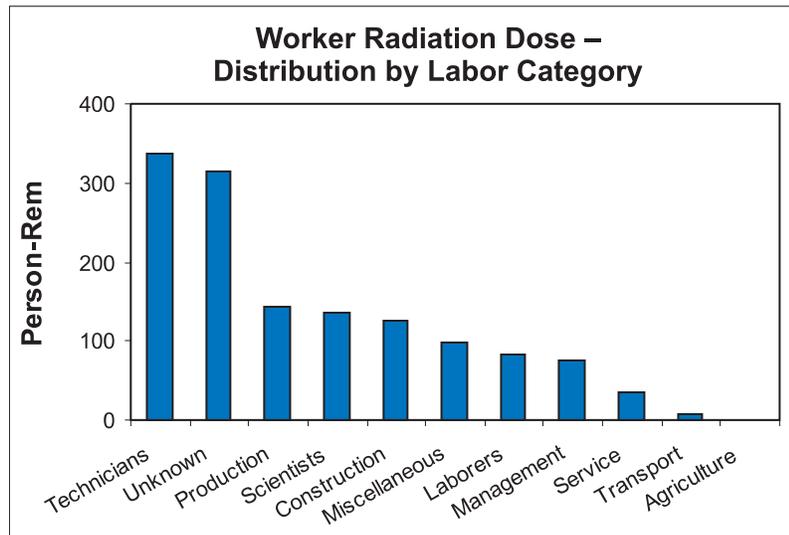


- The percentage of the DOE workforce monitored for radiation exposure has decreased by 12 percent from 1992 to 1997. However, most of the monitored individuals do not receive any measurable radiation dose. Only 19 percent of monitored individuals (14 percent of the DOE workforce) have received a measurable dose during the past 5 years.

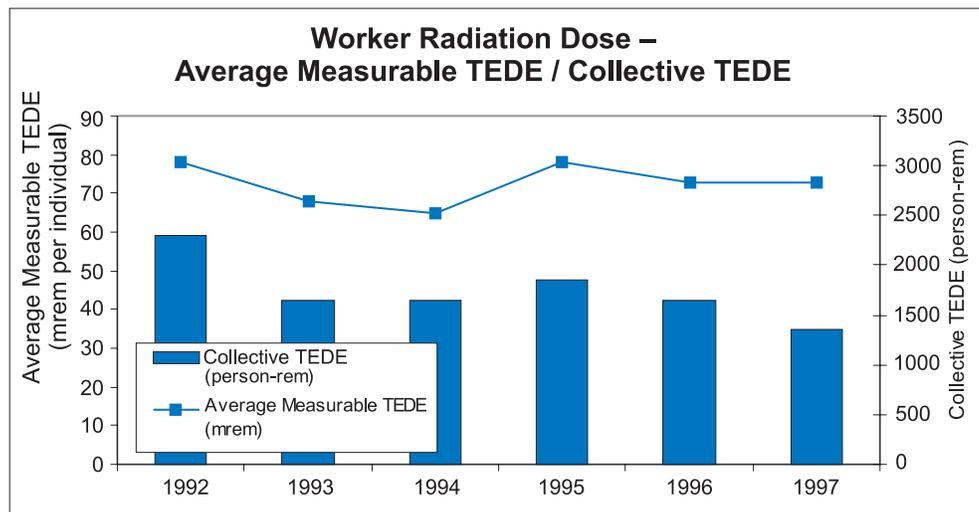


- 87 percent of the collective TEDE for the DOE Complex was accrued at 7 DOE sites in 1997. These 7 sites were (in descending order of collective dose) Rocky Flats, Hanford, Los Alamos, Savannah River, Idaho, Oak Ridge, and Brookhaven. It should be noted that Rocky Flats and Hanford accounted for 41 percent of this dose and are the two largest contributors to the collective TEDE. These sites were primarily involved in nuclear materials stabilization and waste management.

Savannah River and Brookhaven experienced the largest percentage decreases (34 and 41 percent) in collective TEDE of the 7 sites.



- Technicians continue to receive the highest collective dose of any specified labor category.
- Of the technicians, forty-two percent of the dose is attributed to radiation protection technicians.



- The number of workers with measurable internal dose increased by 19% from 1996 to 1997, and the collective TEDE increased 15% primarily due to reporting of radon doses by the Grand Junction Office for the first time in 1997. The radon doses are the result of environmental remediation activities of uranium tailings at the former Monticello uranium mill site. 1997 is the first year radon was tracked as a source of occupational exposure for DOE.
- At Rocky Flats, the collective neutron dose increased 120 percent in 1997 because of activities related to product stabilization and decommissioning and decontamination activities.

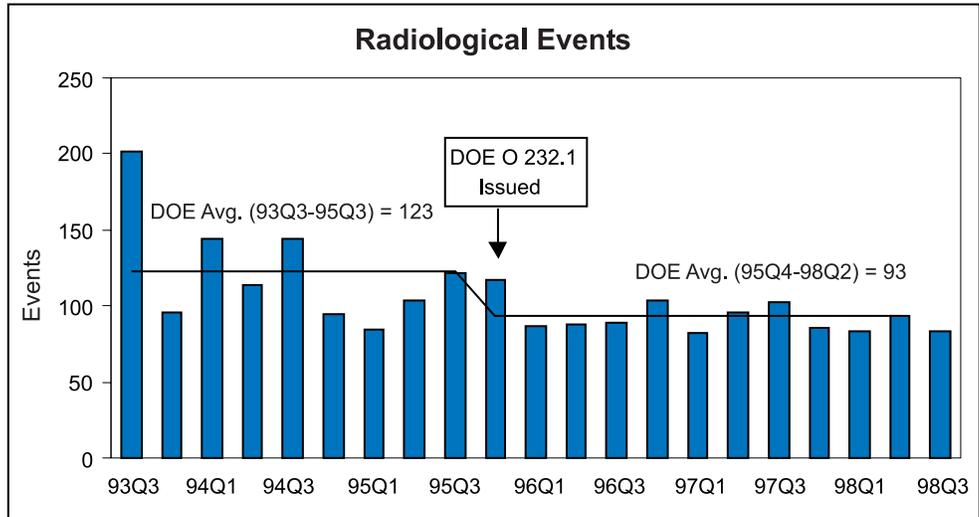
This page intentionally left blank.

Indicator

11. Radiological Events

Definition

Number of reportable radiological events as defined in DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*. These events are made up of both personnel contaminations and radiation exposures that are reported as personnel radiation protection events.



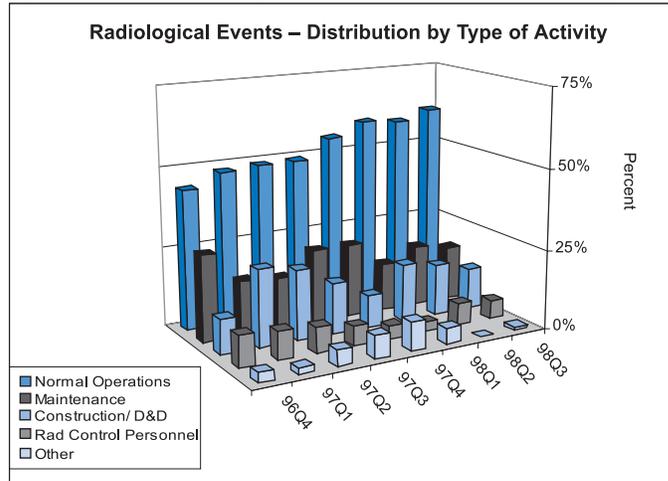
Source: Review of Occurrence Reports by Department Analysts.

Key Observations

- The number of radiological events reported per quarter, since the full implementation of DOE O 232.1 in 1996Q1, demonstrated no statistically significant improvement or deterioration in Departmental performance.
- In 1998Q3, 122 individuals were contaminated in the 83 reported radiological events as compared to an average of 112 contaminated individuals per quarter in 1997. 27 were contaminated/exposed in two separate events at Argonne National Laboratory – West, and the Y-12 site.
- The 1997Q2 report noted that the source of five personnel contaminations was suspected to be “clean” contractor-issued clothing from the laundry. In 1998Q2, 11 of the 122 personnel contaminations (9%) were attributed to “clean” laundry. Again in 1998Q3, 8 of 122 personnel contaminations (7%) were attributed to “clean” laundry. This observation warrants further scrutiny to assure radiological control programs are adequate to provide proper protection of the workforce.

Distribution by Activity

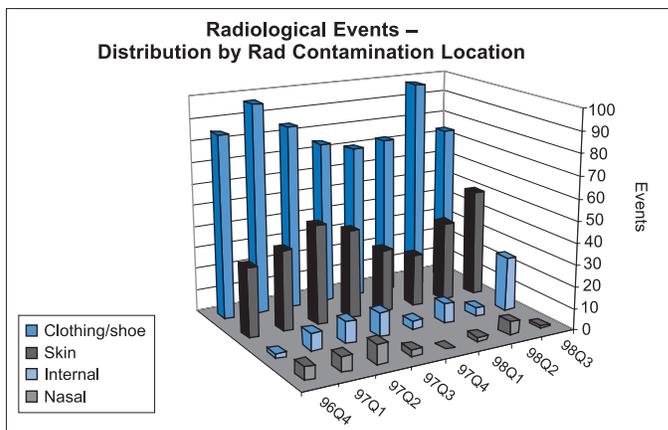
- The radiological events reported over the time period 96Q4 – 98Q3 were analyzed as to the type of activity that was taking place at the time of the contamination. This chart represents this analysis.



Additional Analysis

Distribution by Radiological Contaminant Location

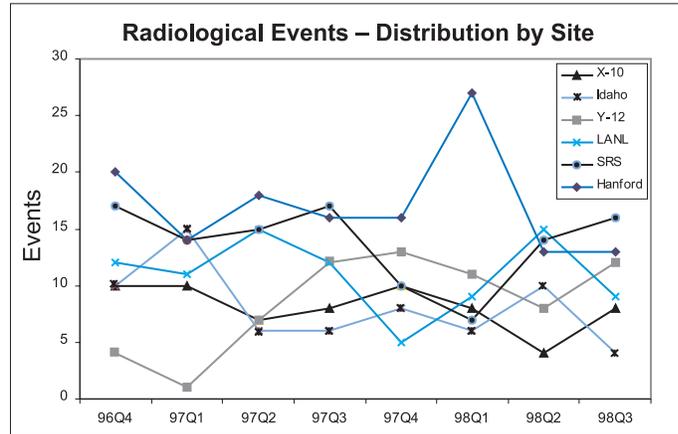
- The radiological contamination events reported over the time period 96Q4 – 98Q3 were analyzed as to the location on the individual where the contamination occurred. This chart represents this analysis.



- Of the 39 reports which identified the isotope involved in the event, the predominant isotopes were Plutonium 238/239, Uranium 235/238, Strontium 90, and Cesium 137.
- The Uranium Conversion Processing and Handling Facility at the Oak Ridge Y-12 site reported that several workers conducting casting and parts cleanup operations had elevated personal air monitor results. Follow-up bioassay results indicated that 16 workers had received an uptake. The committed effective dose equivalent (CEDE) for those individuals ranged from 28 mrem to 875 mrem. Eleven of these individuals have been cleared to resume normal duties. Four other internal contaminations occurred at Argonne National Laboratory – West during a maintenance activity to repair a seal tube between the operations corridor and a hot cell. The CEDE for these four individuals ranged from 0.2 mrem to 1 mrem.
- A laboratory analyst at the Idaho National Engineering and Environmental Laboratory received an uptake of plutonium 239/240 as a result of preparing and analyzing a sample of powdered graphite. Preliminary results indicate that the analyst received a CEDE of 5.79 rem and a dose to the surface of the bone of 59.9 rem.

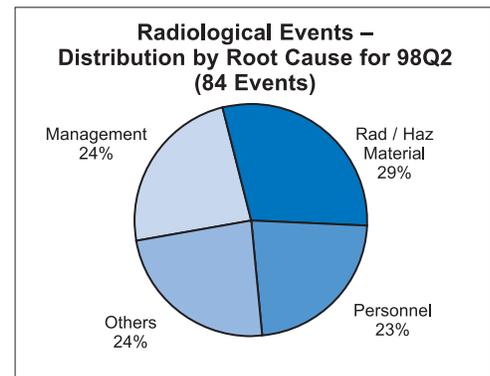
Distribution by Site

- The radiological contamination events reported over the time period 96Q4 – 98Q3 were analyzed as to the site reporting the event. This chart represents the distribution of the major contributing sites.



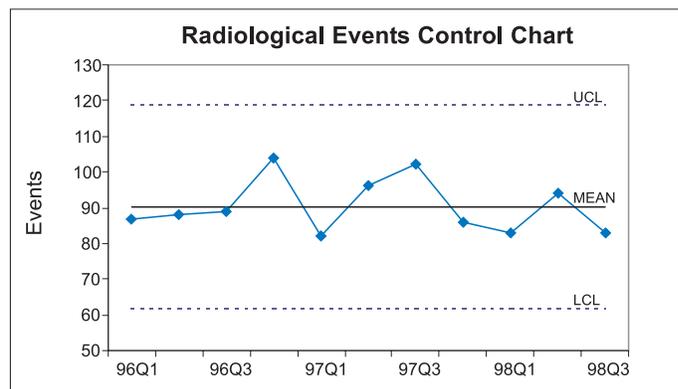
Distribution by Root Cause*

- Of the 95 radiological events reported in 98Q2, 84 had a root cause analysis completed at the time of this report.



Statistical Process Control (SPC) Analysis

- The processes in place to prevent radiological contamination events remains within statistical process control.



* Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

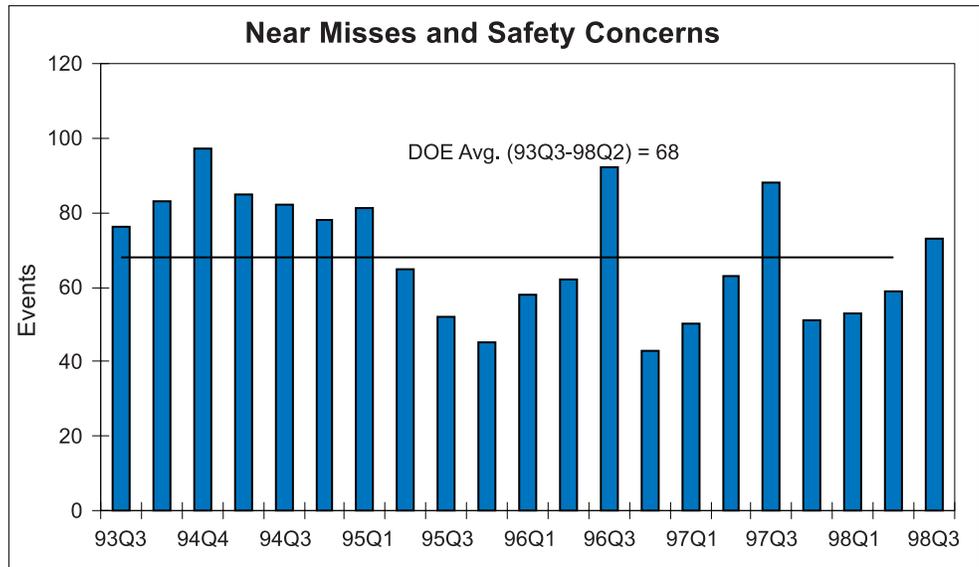
This page intentionally left blank.

Indicator

12. Near Misses and Safety Concerns

Definition

A near miss is an operational event where barriers to an accident have been compromised such that no barriers or only one barrier remain (e.g., lack of fall protection, electric shock without injury, unauthorized confined space entry). A safety concern includes: the unauthorized use of hazardous products or processes, or when work is shut down as a result of an OSHA violation. Near misses and safety concerns are reportable under DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*.



Source: Review of Occurrence Reports by Department Analysts.

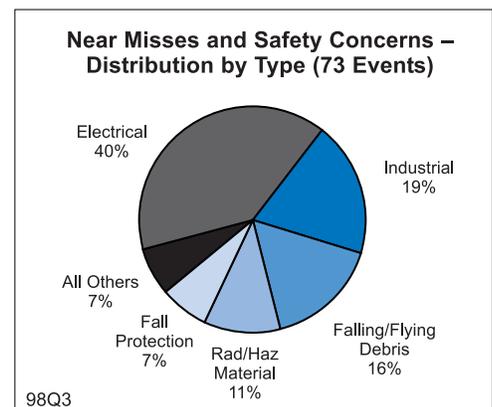
Key Observations

- Near miss and safety concern events continue to increase since 97Q3. Indications are stronger that a cyclical trend is developing similar to the ones that began in 95Q4 and 96Q4.
- Ten injuries occurred from these 73 events in 98Q3. In each of these cases, much more serious injuries could have resulted.

Additional Analysis

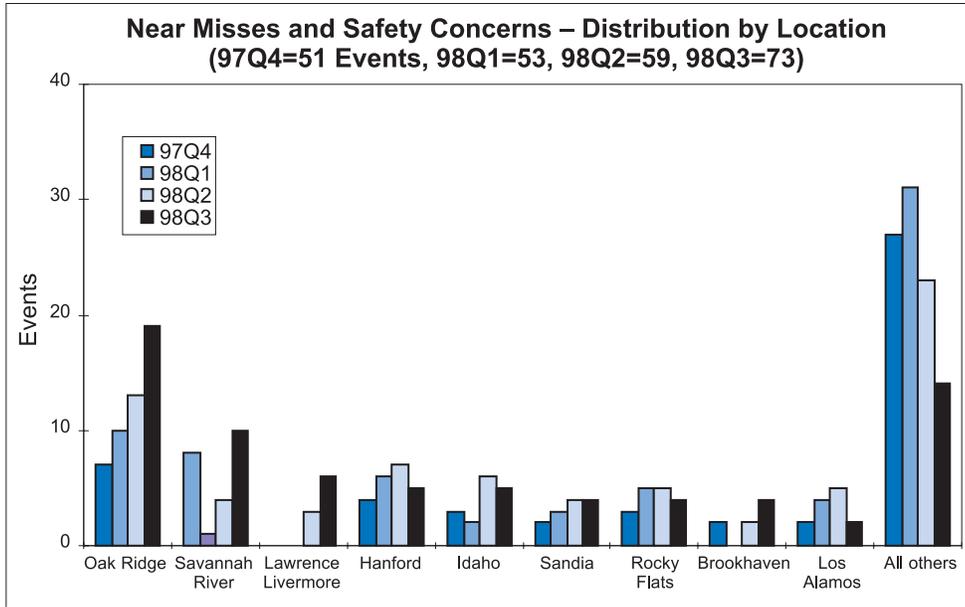
Distribution by Type of Hazard

- Electrical and Industrial activities were responsible for the majority (59%) of the near misses and safety concerns events.
- Only 4 of 73 events involved decontamination and decommissioning activities. None of these four resulted in injuries.



Distribution by Location

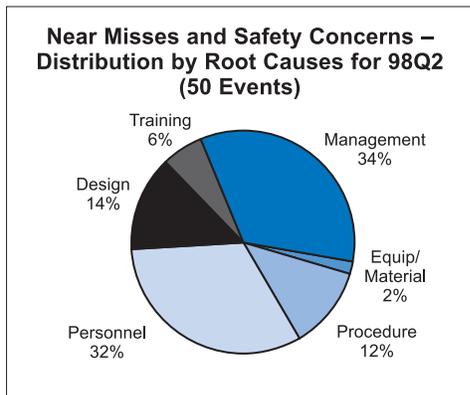
- Oak Ridge and Savannah River continue to exhibit increasing numbers of near misses and safety concerns and comprise the bulk of the increase in events observed this quarter.



Additional Analysis

Distribution by Root Cause*

- In 98Q2, Management Problems and Personnel Errors continue to be the predominant causal factors for most events.
- Management problems were evenly distributed between work planning deficiencies, poor enforcement or dissemination of safety policies, and other management problems.
- The predominant personnel errors involved those with workers not using procedures, and failure to pay attention to the task they were performing.
- In 98Q2, the primary reasons for those events were personnel not paying attention to the activity at-hand and work planning deficiencies. However, in 98Q3, almost half (14 of 29) of the Electrical-related near misses occurred because personnel chose to ignore work-safe practices and procedures during planning or performance of electrical work activities, putting them and others at risk to serious injury or possible fatality.



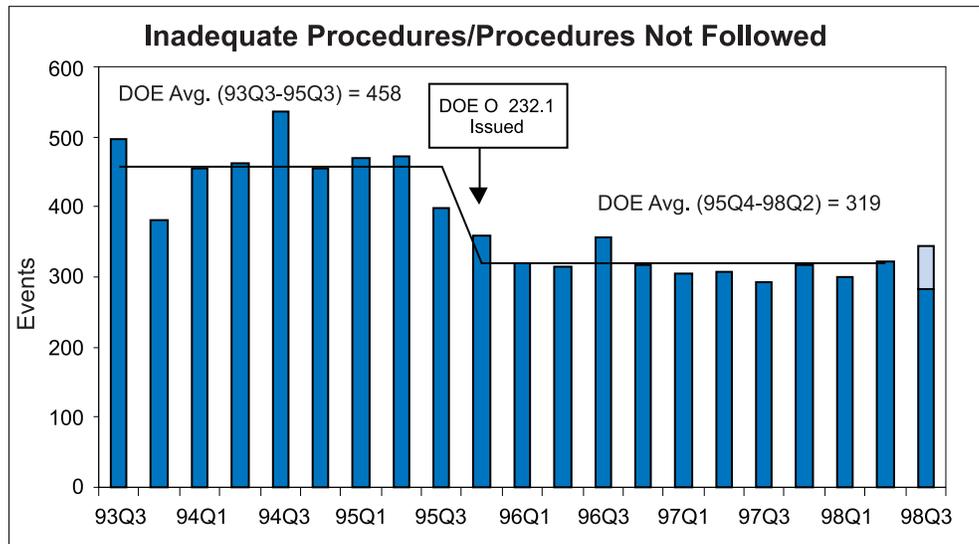
* Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

Indicator

13. Inadequate Procedures/Procedures Not Followed

Definition

Number of reportable events as defined in DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*, either categorized as procedure violations or problems, or reportable as being caused by a procedure violation or problem.



Source: Review of Occurrence Reports by Department Analysts.

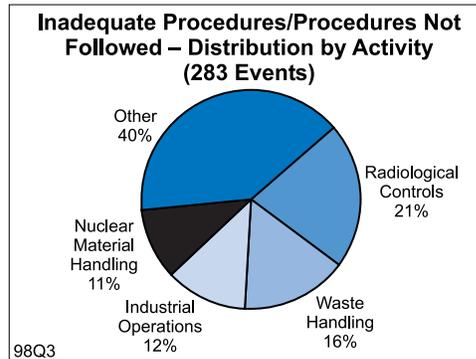
NOTE: Extended portion at the top of 98Q3 depicts the estimated increase due to revisions and finalization of root causes of occurrences.

Key Observations

- The number of procedural related events reported in 98Q3 (283 events) decreased by over 10% compared to 98Q2. It must be noted though, that this 98Q3 number is expected to rise over the next couple of months as the root cause for many of these events is finalized. In fact, when comparing the number of events in 98Q3 to the number reported at the same period of the 98Q2 report the number of reports actually rose from 264 events in 98Q2 to 283 this quarter. If the pattern is consistent during the next few months, the final number of procedural related events in 98Q3 would be expected to rise to approximately 345 events.
- Of note this quarter is the fact that the percentage of unusual events has decreased. Last quarter, 15% of the reported procedural events were unusual events. In 98Q3, this percentage has dropped to less than 10%.

Distribution by Activity

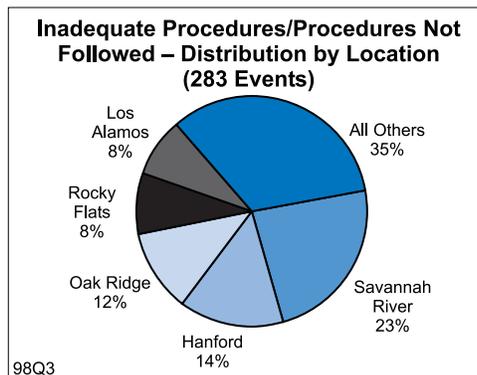
- In 98Q3, the largest contributor by activity type was radiological controls, (60 events). This is consistent with 98Q2 (61 events).
 - Of these radiological controls related events, the majority involved radiological posting or access controls (35%). Procedure inadequacies or violations involving radiological controls equipment such as personnel dosimeters and air monitors was the other major contributor (25%) in this category.



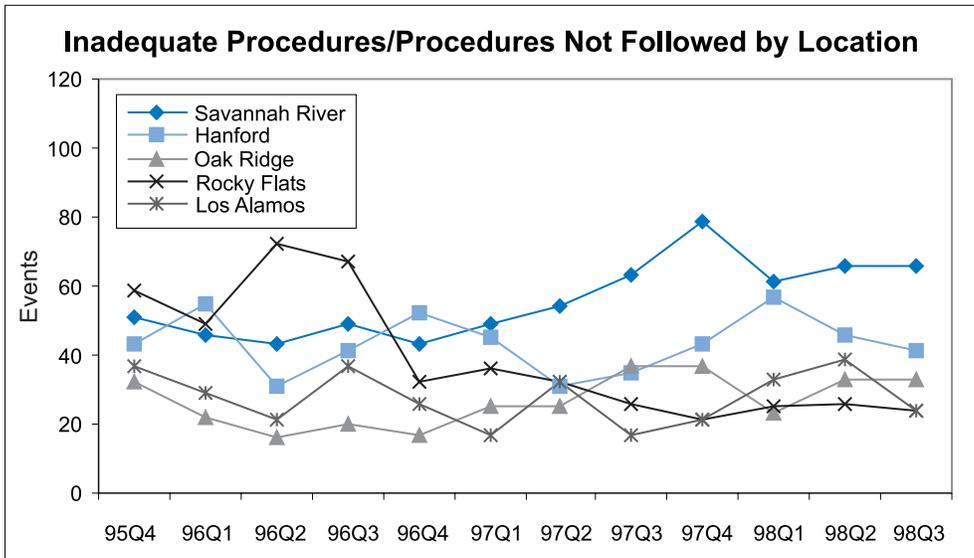
- The number of electrical safety related procedure violations dropped in 98Q3 by almost 25%.

Distribution by Location

- In 98Q3, Savannah River, Hanford, Oak Ridge, Rocky Flats, and Los Alamos continued to be the largest contributors within the Department. This has consistently been the case for the last 20 quarters.
- The number of procedural related events at Savannah River in 98Q3 was 20% higher than the Savannah River average since 95Q4. These events were primarily related to waste handling activities (27%), radiological controls (12%), and nuclear material handling (11%).



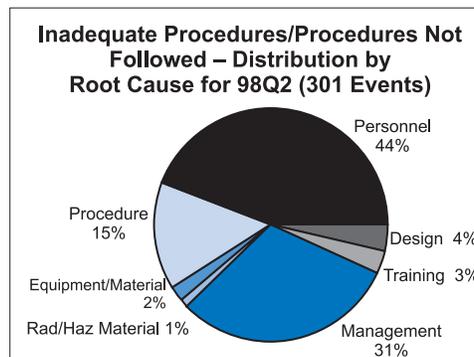
Additional Analysis



- Of the other three primary contributors, only Los Alamos showed an appreciable change over last quarter's numbers. In this case, Los Alamos showed a decrease of almost 40% (39 in 98Q2 and 24 in 98Q3). The improvement is related largely to a decrease in the number of high explosives safety and waste-handling procedure related events.

Distribution by Root Cause*

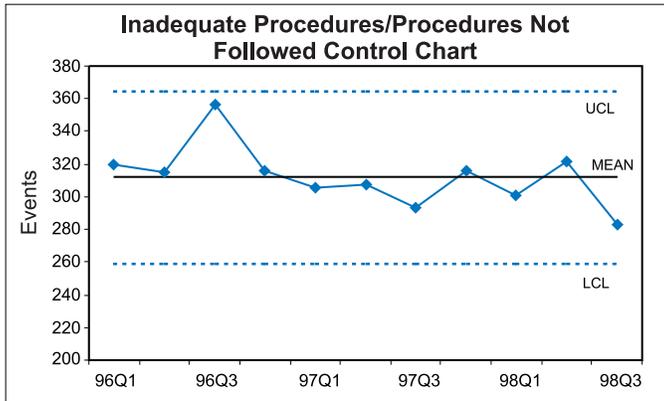
- Of the 322 total procedural related events reported in 98Q2, 301 had root causes assigned. Of these, the top 3 categories were personnel (133 events), management (94 events), and procedure (44 events).
- Of the personnel errors cited, procedures not used or used incorrectly was the most frequently cited root cause (53%). The next largest contributor was inattention to detail (37% of these events). This is consistent with the past several quarters.
- The top three management root causes cited were "Inadequate Administrative Controls" (33 events); "Policy Not Adequately Defined, Disseminated, or Enforced" (32 events); and "Work Organization/Planning Deficiency" (17 events).
- The most frequently cited procedural root cause was defective or inadequate procedure (39 events). This has also been the case for the last 20 quarters.



*Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

Statistical Process Control (SPC) Analysis

- The processes in place to control procedural related events remains within statistical process control.



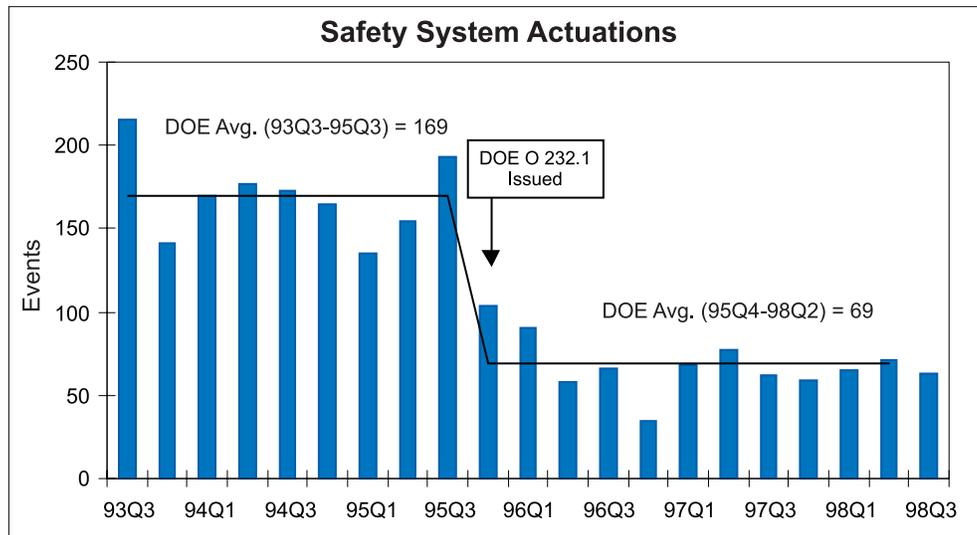
- The 98Q3 data point is expected to increase due to further identification of root causes by 98Q4.

Indicator

14. Safety System Actuations

Definition

Number of operations-related events determined to be safety system actuations reportable under DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*. This includes real actuations of any safety-class equipment or alarm, unplanned electrical outages, unplanned outages of service systems, serious disruptions of facility activity related to weather phenomena, facility evacuations, or losses of process ventilation. These events have the potential to impact the safety and health of workers in the vicinity.



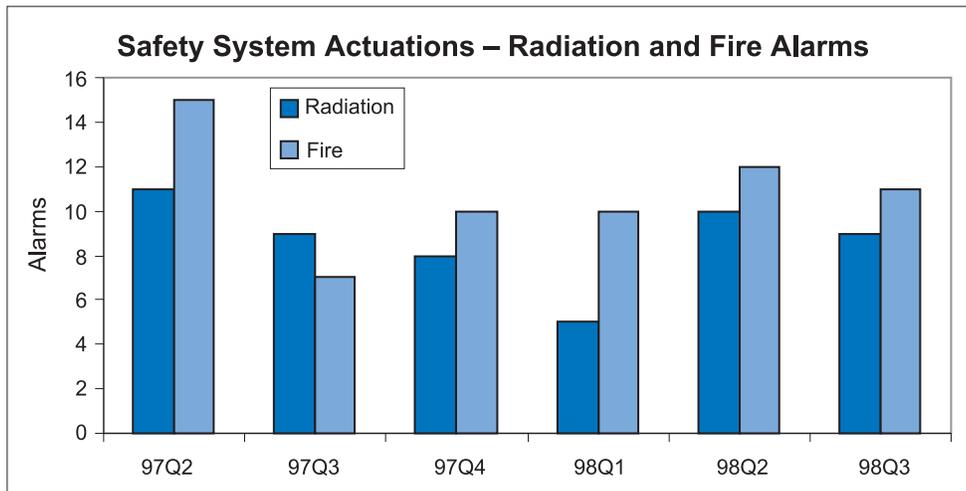
Source: Review of Occurrence Reports by Department Analysts.

Key Observations

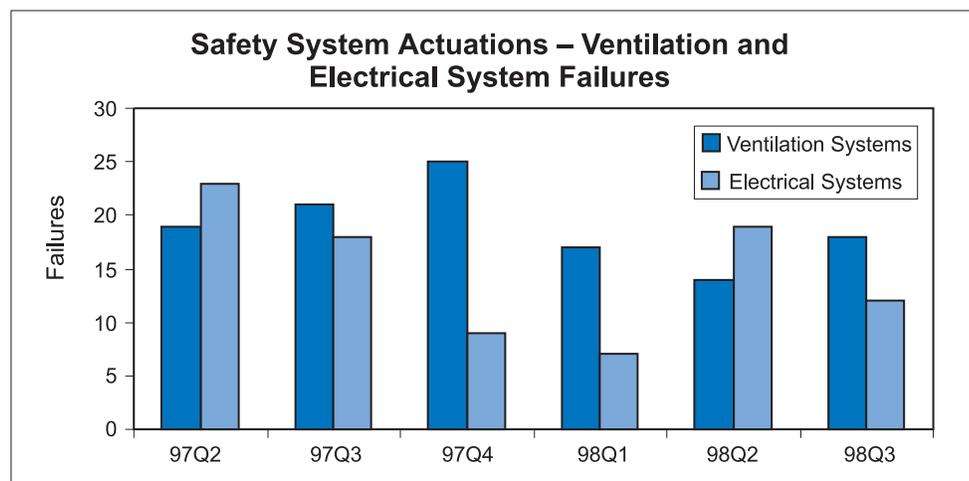
- The number of safety system actuation events reported in 98Q3 (63) is consistent with the average number of actuation events reported since issuance of DOE O 232.1 in 95Q4.
- In 98Q3 there were five events categorized as emergency events, the highest number of emergency occurrences since 96Q3 (6). Three of the events were at the Idaho National Engineering and Environmental Laboratory (INEEL). The first involved the release of Carbon Dioxide resulting in a personnel fatality, the second event occurred when a controlled land burn went out of control, and the third event was the result of a bomb scare. One of the remaining two emergency events occurred at the Y-12 site, and involved the discovery of a suspicious and unattended briefcase. The second event took place at the Argonne National Laboratory – West involving the loss of radioactive material resulting in personnel contamination.

Distribution by Alarm System

- The following chart represents non-spurious radiation and fire alarms, reported over the time period 97Q2 – 98Q3.



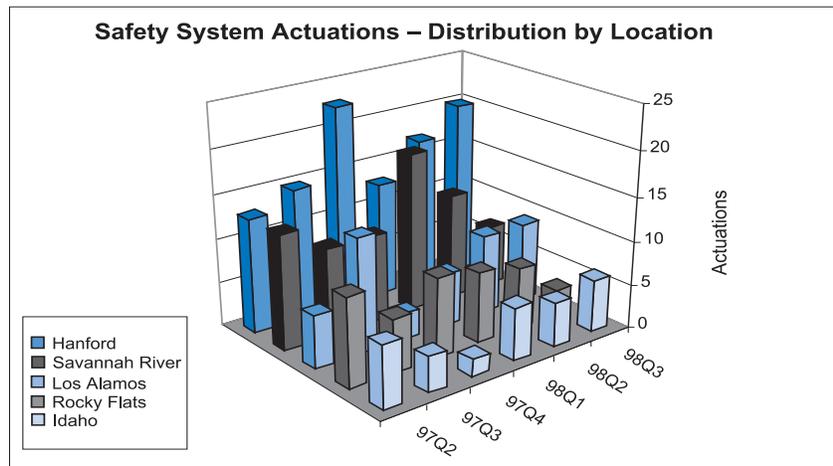
System failures also constitute a portion of the safety system actuations reported in 98Q3. The two primary contributors are process ventilation failure (18) and electrical system failure (12).



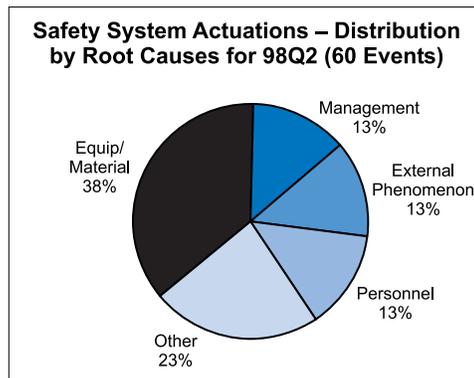
- The increase in electrical system failures in the second and third quarters of each calendar year, is largely attributed to increased thunderstorm activity with resultant lightning induced power failures.
- Weather phenomena were a factor in 8 of the reported safety system actuation events in 98Q3.

Additional Analysis

Distribution by Location



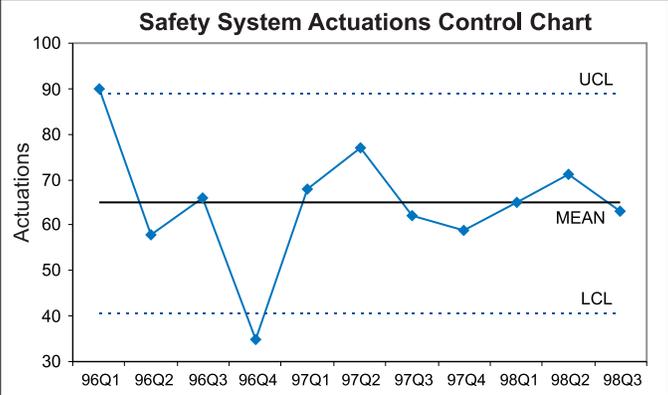
Distribution by Root Cause*



* Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

Statistical Process Control (SPC) Analysis

- The 96Q4 data point is being treated as an outlier. The processes affecting safety system actuation events remain in statistical process control.



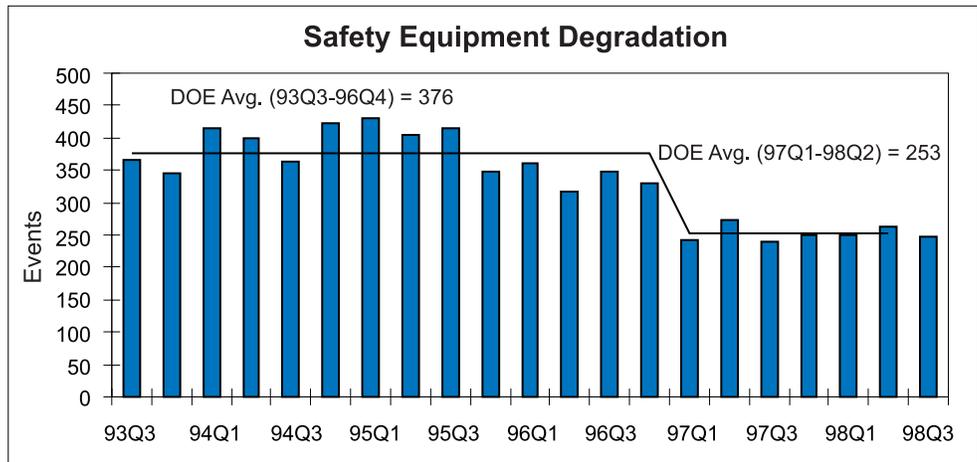
Indicator

15. Safety Equipment Degradation

Definition

Number of reportable events categorized as “vital system/component degradation” as defined in DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*.

Safety equipment degradation includes: (1) any unplanned occurrence that results in the safety status or the authorization basis of a facility or process being seriously degraded; or (2) a deficiency such that a structure, system, or component (SSC) vital to safety or program performance does not conform to stated criteria and cannot perform its intended function; or (3) unsatisfactory surveillances/inspections and appraisal findings of any safety SSC.



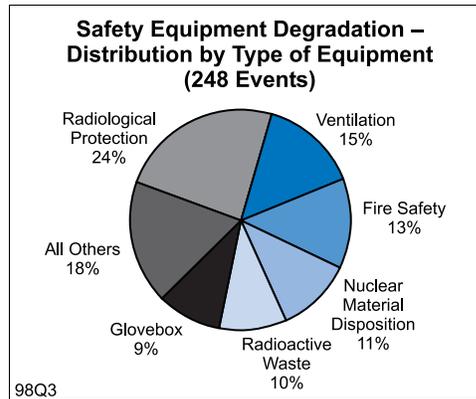
Source: Review of Occurrence Reports by Department Analysts.

Key Observations

- The number of events reported in 98Q3 (248 events) decreased slightly compared to 98Q2 (263 events) and also remained near the DOE average for the previous 7 quarters.
- The re-baselining identified between 96Q4 and 97Q1 is primarily due to a corresponding decrease in the number of events reported at Rocky Flats. Based on discussions with the site, it was at that time that programmatic changes at Rocky Flats led to a better understanding of the definitions of “performance degradation” within the occurrence reporting Order. Consequently, the number of events reported after 96Q4 more accurately represent actual safety system performance degradation.
- Of particular note this quarter was one safety equipment degradation event identified as an emergency occurrence involving a fatality at Idaho’s Test Reactor Area. As a result of faulty design and installation of the fire suppression system, and other management based causes, 1 worker was killed and several others were injured.

Distribution by Type of Equipment

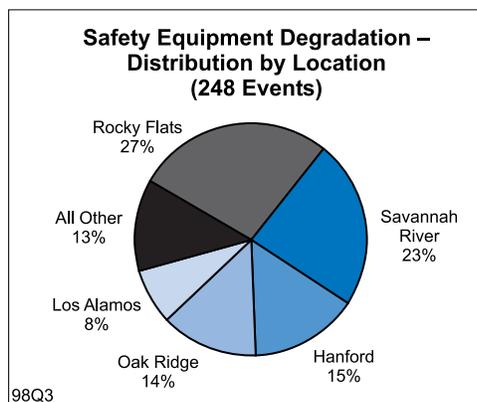
- The major types of equipment degradation events were consistent between 98Q3 and 98Q2. These numbers were also consistent with the average numbers of events for each of these 4 contributors back through 97Q1.
- Statistical analysis of the distribution by equipment type shows an increasing trend in the degradation of radiological protection related equipment.
- This quarter saw the emergence of nuclear material disposition and radioactive waste handling/processing related safety equipment degradation events as significant contributors. The nuclear material disposition related events involved criticality safety operating limits infractions, while the radioactive waste handling/processing related events primarily involved waste tank related equipment degradations.



Additional Analysis

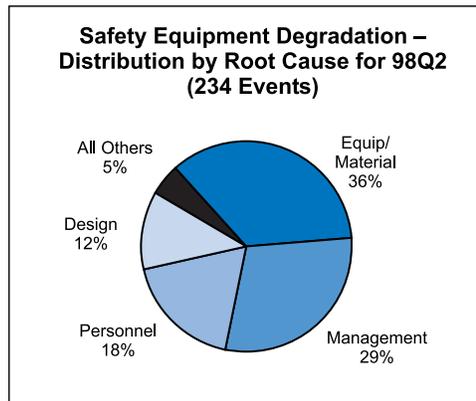
Distribution by Location

- The leading contributors remained consistent with respect to ranking within the Department in 98Q3 when compared to the last several quarters.
- The number of events at Rocky Flats (68 events) remained consistent with 98Q2 (66 events) and consistent with the average number of events since 97Q1 (71 events.)
- The number of events at Savannah River (58 events) remained consistent with 98Q2 (56 events) and consistent with the average number of events since 97Q1 (55 events.)
- Los Alamos National Laboratory experienced 19 events in 98Q3. This is below the number observed in 98Q2 (28 events) and also below the average number of these events since 97Q1 (25 events).



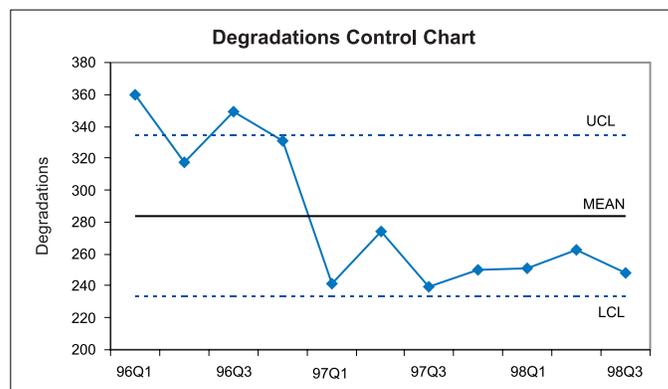
Distribution by Root Cause*

- Of the 263 events reported in 98Q2, 234 (89%) had root causes established at the time that these analyses were performed.
- The root cause for 83 of the safety equipment degradation events was identified as equipment/material problems. Of these, the two most significant sub-categories were Defective or Failed Parts (57 events) and End of Life Failure (18 events.)
- The root cause for 68 safety equipment degradation events were management problems. Of these, the most significant sub-categories of root cause were Inadequate Administrative Controls (21 events) and Policy Not Adequately Defined, Disseminated, or Enforced (19 events.)
- The root cause for 43 safety equipment degradation events involved personnel errors. Of these, the vast majority (32 events) involved Inattention to Detail.



Statistical Process Control (SPC) Analysis

- The control chart for safety equipment degradations indicates a reduction in the number of degradation events beginning 97Q1 due to the programmatic changes at Rocky Flats as discussed in the Key Observations. This shift is substantiated by the run of seven consecutive quarters below the centerline. Since 97Q1 the number of degradations has remained in statistical control at an average of 253.



*Root cause analysis is displayed for the preceding quarter due to time lag between notification of occurrence and issuance of the final report.

This page intentionally left blank.

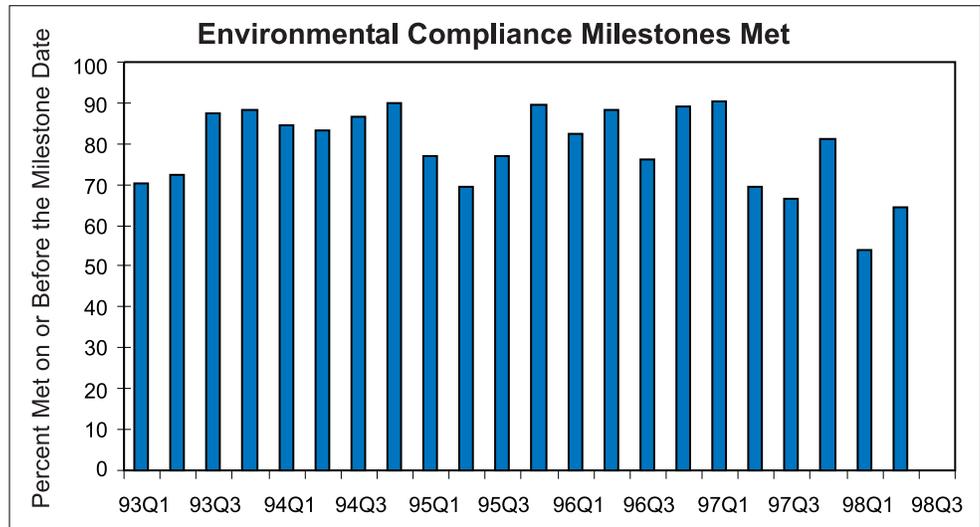
Indicator

16. Environmental Compliance Milestones Met

Definition

Enforceable requirements in environmental agreements met on or before the milestone date (percent).

No change to this section since last report.



Source: Office of Environmental Management; Progress Tracking System Data.

Key Observations

- An average of the most recent 5 quarters indicates DOE is missing an increasing number of enforceable compliance deadlines when compared to past performance. To date in fiscal year 1998, DOE has met only two-thirds of its enforceable milestones.

Additional Analysis

- In 98Q1 and 98Q2, DOE met only 54% and 64% of its enforceable milestones; significantly worse performance than most previous quarters.
- These data do not capture all enforceable milestones. They reflect only those milestones under the purview of the Office of Environmental Management. EM's Progress Tracking System is believed to capture 85-90 percent of all DOE enforceable environmental milestones.

This page intentionally left blank.

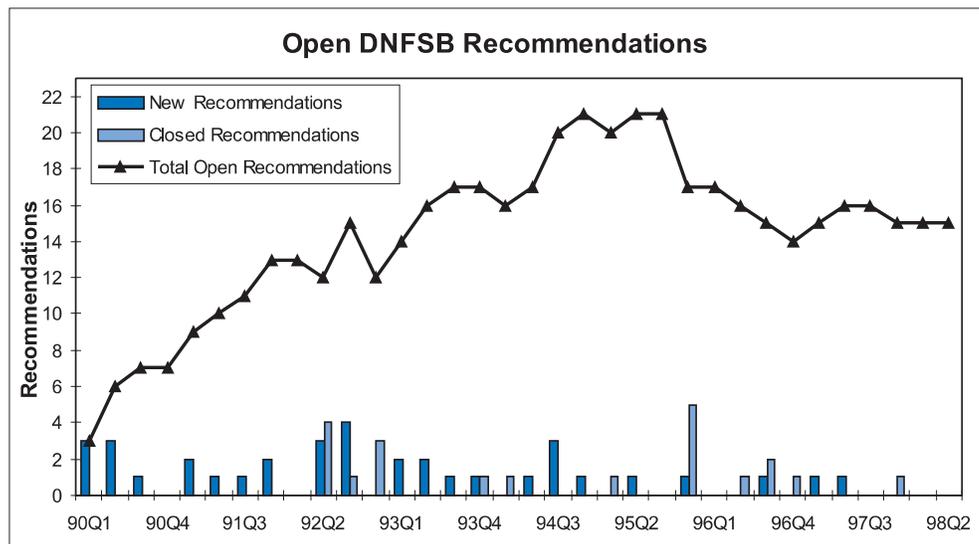
Indicator

17. Open DNFSB Recommendations

Definition

Cumulative number of open Defense Nuclear Facilities Safety Board (DNFSB) recommendations. DNFSB recommendations only apply to DOE defense nuclear facilities and, therefore, are representative only of DOE defense facilities.

Each DNFSB recommendation accepted by DOE leads to an implementation plan containing a set of commitments which, when fully implemented, will resolve the safety issues and lead to closure of the recommendation. A commitment is any documented obligation by the Secretary, or designee, that describes products to be delivered on a specified schedule. Commitments resulting from DNFSB recommendations are tracked by the Office of the Department Representative to the DNFSB (S-3.1) as completed (fulfilled), not yet due, and overdue.



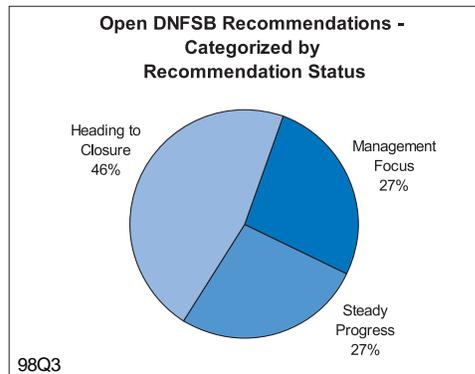
Source: Safety Issues Management System (SIMS)

Key Observations

- As of October 1, 1998, there were 15 open DNFSB recommendations representing 628 DOE commitments. Of the 628 commitments, 395 (63%) were completed, 149 (24%) were open and not yet due, and 84 (13%) were open and overdue. A total of 28 commitments were completed over the past quarter.
- The number of overdue commitments (84) continues to increase despite a one-time reduction that occurred in May 1998 when a revised Implementation Plan was developed for Recommendation 93-3, *Improving Technical Capability*. Most of the increase is associated with overdue commitments for Rec. 93-3 (48% of total).
- Two new Recommendations were accepted by DOE in late November 1998; 98-1, *Resolution of Internal Oversight Findings*, and 98-2, *Integrated Safety Management at Pantex*.

Characterization of Recommendation Status

- This chart shows an evaluation by S-3.1 on the number of open DNFSB recommendations categorized by recommendation status. A status of “Heading to Closure” includes the existence of a clearly defined path to closure, and the expectation that the remaining commitments/actions can be completed within the next year. “Steady Progress” implies the existence of an acceptable implementation plan with most commitments/deliverables generally being completed on schedule. Recommendations classified as “Management Focus” involve difficulties with (or lack of) an implementation plan or a large number (8) of overdue commitments.



- During this quarter, two recommendations, 98-1 and 98-2, were added to the Management Focus list, as they are pending acceptance or rejection by the Secretary. Once implementation plans have been accepted, commitments will be tracked to completion in future quarters and the above chart will reflect the new percentages.
- Recommendation 97-2 (Continuation of Criticality Safety) was moved from the Management Focus category to the Steady Progress category as progress reduced the number of overdue commitments below the threshold value of 8.
- All commitments for Recommendation 95-2 (Safety Management) have been completed and are awaiting closure pending approval by the DNFSB.
- The Office of Environmental Management completed a comprehensive revision to the 94-1 implementation plan, on December 28, 1998.

Additional Analysis

Distribution of Open Commitments

Office	DNFSB Recommendations	Commitments	Complete		Not Yet Due		Overdue		Open	
			Count	%	Count	%	Count	%	Count	%
EM	7	394	267	68%	95	24%	32	8%	127	32%
DP	4	131	103	79%	20	15%	8	6%	28	21%
EH	2	21	16	76%	1	5%	4	19%	5	24%
HR	1	75	2	3%	33	44%	40	53%	73	97%
NE	1	7	7	100%	0	0%	0	0%	0	0%
DOE	15	628	395	63%	149	24%	84	13%	233	37%

NOTE: % is percentage of total commitments for that office.

- The table above provides an overview of the status of DNFSB recommendations and commitments. The following two Offices have 72 (86%) of the 84 overdue commitments: Office of Human Resources and Administration and the Office of Environmental Management. 48 percent of the overdue commitments are associated with Rec. 93-3.
- The Office of Environmental Management continues to have the largest number of open commitments (127) and the largest number of closed commitments.
- The total number of overdue commitments reached its highest level this quarter (84) despite a reduction in overdue commitments when the revised implementation plan for Rec. 93-3 was issued in May 1998.
- Three recommendations have 100 percent of their associated commitments complete: Rec. 93-6 (Maintaining Access to Nuclear Weapons Expertise), Rec. 95-1 (Cylinders Containing Depleted Uranium) and 95-2 (Safety Management). The Department proposed and is awaiting closure for all three.

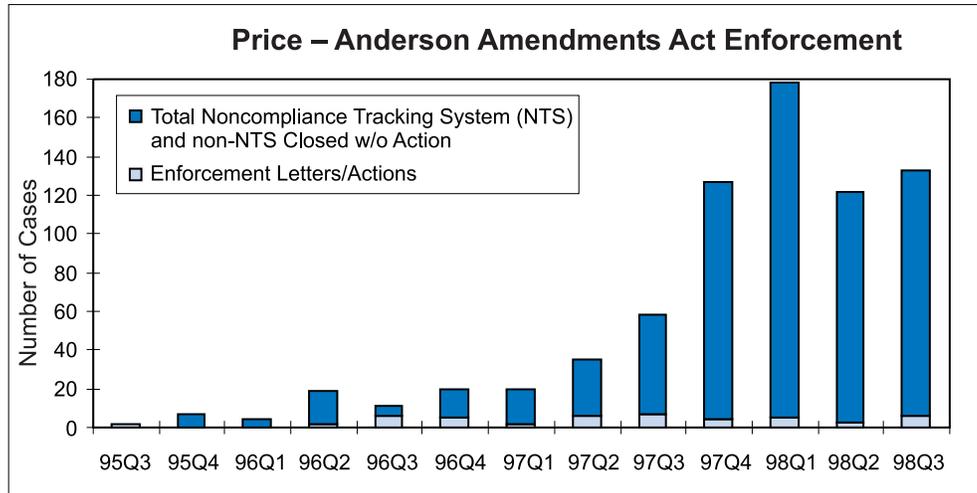
This page intentionally left blank

Indicator

18. Price-Anderson Amendments Act Enforcement

Definition

Total number of cases the Price-Anderson Amendments Act^a (PAAA) Enforcement Office reviews per quarter.



Source: Office of Enforcement and Investigation Database.

Key Observations

- The PAAA, Office of Enforcement and Investigation reviewed 127 reports without action in 98Q3 and issued six Preliminary Notices of Violation (PNOVs) with civil penalties totaling \$396,250. It should be noted that \$266,250 in civil penalties was waived due to a statutory exemption for laboratories.
- The six PNOVs issued this quarter were the most issued in any one quarter by the PAAA Enforcement Office. DOE weighs several issues when deciding to issue a PNOV with a civil penalty or when considering the amount of the civil penalty: (1) the safety significance of the noncompliance, (2) initiative by the contractor in identifying and reporting the noncompliance, and (3) the timeliness and effectiveness of corrective actions.

Additional Analysis

- Two PNOVs were issued without civil penalties to Oak Ridge contractors on September 21, 1998. Lockheed Martin Energy Systems, Inc. and MK-Ferguson of Oak Ridge Company each received PNOVs for Severity Level III^b violations for deficiencies in the administration of the MK-Ferguson bioassay program during the time period between 1996 and 1997.
- Two PNOVs with waived civil penalties were issued to Lawrence Livermore National Laboratory (LLNL) and to Los Alamos National Laboratory (LANL).
 - On July 28, 1998, LLNL received a waived civil penalty of \$153,750 for Severity Level II^b violations of work control deficiencies. This was the result of several failures to meet facility procedural requirements governing the movement and placement of fissile materials, and neutron moderation and reflection materials during the period of May 6 through December 2, 1997.

^a 10CFR Parts 830.120, 835, 820.11.

^b Severity Levels are defined in Appendix A, Section VI, as amended, to 10 CFR 820.

- On September 21, 1998, LANL received a waived civil penalty of \$112,500 for Severity Levels II and III^b violations related to a series of events at the Chemistry and Metallurgy Research Facility which led to a stand-down of all normal operations within the facility on September 2, 1997.
- Two PNOVs with civil penalties were issued to two contractors: Westinghouse Savannah River Company (WSRC) and Lockheed Martin Idaho Technologies Company (LMITCO).
 - The WSRC PNOV, issued on September 21, 1998, carried a civil penalty of \$75,000 for Severity Level II^b violations concerning deficiencies in WSRC's bioassay participation requirements and corrective actions to remedy those deficiencies.
 - The LMITCO PNOV, issued on September 21, 1998, carried a civil penalty of \$55,000 for Severity Level II^b violations concerning unauthorized disabling of the seismic scram subsystem discovered in October 1997, and surveillance deficiencies that occurred in October 1997 at the Advanced Test Reactor Critical Facility.
- Of the 127 cases reviewed and closed without action by the PAAA Enforcement Office in 98Q3, 22 (17%) were self-identified by the responsible contractor via the Noncompliance Tracking System and 105 (83%) were identified independently by the PAAA, Office of Enforcement and Investigation.
- The new graphical user interface version of the Noncompliance Tracking System went operational on June 8, 1998. The new system provides a vehicle for easier reporting by contractors.

Indicator

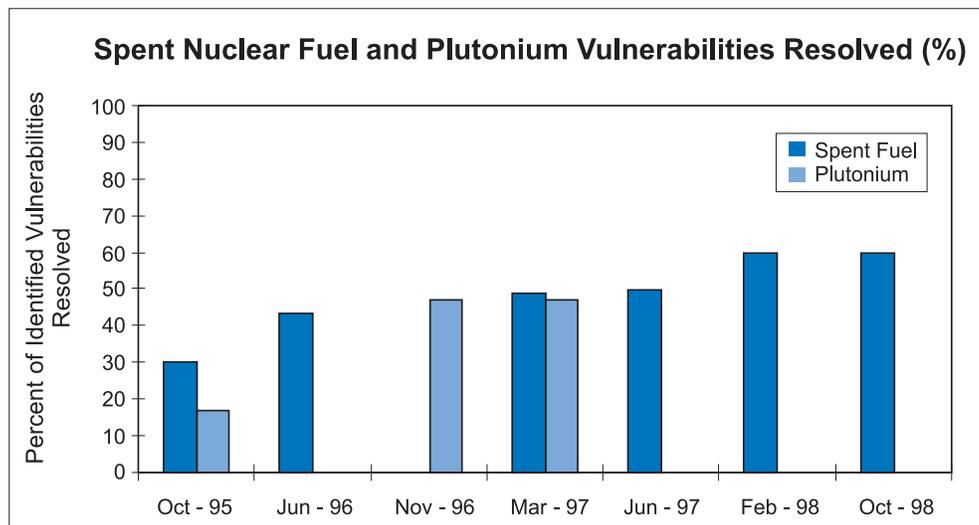
19. Spent Nuclear Fuel and Plutonium Vulnerabilities Resolved

Definition

Number of resolved plutonium and spent fuel vulnerabilities divided by the total number of vulnerabilities as defined in *Spent Fuel Working Group Report on Inventory and Storage of the Department's Spent Nuclear Fuel...and Their Environmental, Safety, and Health Vulnerabilities*, Volume 1, November 1993, and *Plutonium Working Group Report on Environmental, Safety, and Health Vulnerabilities*, Volume 1, November 1994 (DOE/EH-0415).

No updated Plutonium data during the last three reporting periods.

An ES&H vulnerability is defined in the plutonium and spent fuel vulnerability reports as "conditions or weaknesses that could lead to unnecessary or increased radiation exposure of workers, release of radioactive material to the environment or radiation exposure to the public." A resolved vulnerability implies that the cited condition no longer exists, the risk has been minimized to an acceptable level, or the risk has been evaluated at an active facility and judged to be acceptable. Vulnerabilities can be characterized as material/packaging (e.g., storage of unstable and corrosive solutions), facility condition (e.g., facility weakness), or institutional (e.g., loss of experienced personnel) vulnerabilities. The vulnerabilities were ranked by significance based on the likelihood of an accident and the perceived consequences.



Source: EM-66, *Draft Plutonium Vulnerability Management Summary Report*; EM-67, *Report on Status of Corrective Actions to Resolve Spent Nuclear Fuel Vulnerabilities*.

Key Observations

- There were 299 plutonium vulnerabilities identified at 13 sites and 106 spent nuclear fuel vulnerabilities identified at 8 sites based on reports issued in 1993 and 1994.
- The most spent nuclear fuel vulnerabilities (34 percent) were identified at Hanford, which currently maintains 86 percent of the DOE total spent nuclear fuel inventory by weight.
- No spent fuel vulnerabilities have been identified as being resolved since February

Additional Analysis

1998.

- There were 536 identified corrective actions for the 106 spent nuclear fuel

Table 1

Spent Nuclear Fuel Site	Vulnerabilities Identified	Vulnerabilities Resolved	Percent Resolved
Hanford	36	23	64%
Idaho	33	11	33%
Savannah River	21	19	90%
All Others	16	11	69%
Total	106	64	60%

vulnerabilities. Of these 536 corrective actions, 449 (84 percent) have been completed.

Table 2

Plutonium Site	Vulnerabilities Identified	Vulnerabilities Resolved	Percent Resolved
Rocky Flats	87	33	38%
Los Alamos	60	41	68%
Savannah River	40	10	25%
Hanford	34	9	26%
All Others	78	47	60%
Total	299	140	47%

Vulnerability resolution status has been updated for this report from the Draft Plutonium Working Group dated March 1997.

- The table above (Table 1) indicates the breakdown of spent nuclear fuel vulnerabilities as of 97Q2 by location and the progress in resolving the identified vulnerabilities.
- The most plutonium vulnerabilities (87) were identified at Rocky Flats, which maintains 80 percent of the DOE total plutonium inventory by weight. Of these 87 vulnerabilities, 15 have been eliminated and an additional 18 have had the risk reduced to an acceptable level.
- Los Alamos had similar results in closing plutonium vulnerabilities with 14 vulnerabilities eliminated and the risk in 27 other issues reduced to an acceptable level.
- Fifteen of the top 46 highest risk plutonium vulnerabilities, DOE-wide, have been resolved. Seven of the highest plutonium vulnerabilities were eliminated; the risk for 8 other vulnerabilities has been reduced to an acceptable level.
- The above table (Table 2) indicates the breakdown of plutonium vulnerabilities as of 97Q1 by location and the progress of resolving the identified vulnerabilities.

Indicator

20. HEU Vulnerabilities Resolved

Definition

Percentage of vulnerabilities identified in the *Highly Enriched Uranium Working Group Report on Environmental, Safety and Health Vulnerabilities Associated with the Department's Storage of Highly Enriched Uranium* (DOE/EH-0525) that have been resolved.

An ES&H vulnerability is defined in the HEU Working Group Report as "conditions or weaknesses that could result in the exposure of workers or the public to radiation, or in releases of radioactive materials to the environment."

This indicator will be used to measure the progress in resolving the total of 155 ES&H vulnerabilities found in the assessment, and also specific subsets of these vulnerabilities: 1) the facility and material condition vulnerabilities ranked by the HEU Working Group as being of highest significance, 2) vulnerabilities at specific sites, and 3) vulnerabilities involving U-233.

A significant fraction of the HEU Working Group's assessment involved U-233, stemming from this isotope's particular radiological properties (and those of U-232 co-produced with U-233). The HEU Working Group concluded that a special management plan is needed for safe interim storage of U-233 materials. Thus, U-233 vulnerabilities will be tracked as a separate group, even though this will involve "double counting" of some vulnerabilities ranked as having the highest significance and/or grouped in the "Total, DOE-wide" category.

Key Observations

HEU Vulnerability Set	Vulnerabilities Identified	Vulnerabilities Resolved	P.I.= % Resolved
Total, DOE-Wide	155	55	33%
Highest Significance	21	5	24%
U-233 Vulnerabilities	14	2	15%

The table above summarizes the Department-wide status of HEU vulnerability resolution including the subsets of Highest Significance and U-233 Vulnerabilities:

- Fifty-five HEU vulnerabilities were resolved through 98Q1 as part of the DNFSB Recommendation 97-1 Implementation Plan actions, the HEU Vulnerability Management Plan, and/or Site-Specific HEU Management Plans.

The following table summarizes vulnerabilities on a site basis for 98Q2. Note that Oak Ridge Y-12 Plant stores a far greater amount of HEU (greater than 189 metric tons) than any other site. Also note that Oak Ridge National Laboratory and Idaho National Environmental Engineering Laboratory have the largest quantities of U-233 as shown in parentheses (424 and 351.6 kilograms, respectively). Actual inventories of U-233 are classified in cases where exact amounts are not shown.

HEU Site	HEU Inventory*	Vulnerabilities Identified	Vulnerabilities Resolved	P.I.= % Resolved
Oak Ridge Y-12 Plant	>189.0	49	13	27%
Rock Flats Env. Tech Site	6.7	28	8	29%
Los Alamos National Lab	3.2 (>1.0)	19	2	11%
Portsmouth Gaseous Diffusion Plant	22.0	16	7	44%
Idaho Nat. Engineering & Environmental Lab	>1.0 (351.6)	10	9	90%
Savannah River Site	13.8	9	4	44%
Oak Ridge K-25 Site	1.5	9	5	56%
Oak Ridge National Lab	1.2 (424.0)	6	1	17%
Pantex Plant	16.7**	5	3	60%
Sandia National Laboratories	<1.0	1	—	—
Argonne National Lab-West	<10.0	1	1	100%
Lawrence Livermore National Lab	<1.0 (3.1)	1	—	—
New Brunswick Laboratory	<1.0	1	1	100%

* Inventory of HEU produced in metric tons and U-233 in kilograms (shown in parentheses).

**Includes planned dismantlement.

Additional Analysis

- Led by the Office of Defense Programs (DP), DOE developed the HEU Vulnerability Management Plan, issued on June 13, 1997 by DP-1, that outlines a process for corrective actions and resolution of the HEU vulnerabilities. DP will track the resolution of the HEU vulnerabilities and report these either by a separate quarterly status report, or by information included in status reports that combine HEU vulnerability resolution with those for plutonium and/or spent nuclear fuel vulnerabilities. Moreover, the HEU Vulnerability Management Plan sets dates for resolution of the rest of the 16 HEU vulnerabilities (five have been resolved) designated by the HEU Working Group as being the highest significance. Thus, tracking of the PIs for these vulnerabilities can be shown against scheduled completion dates.
- The resolution of the other 100 HEU vulnerabilities identified in the HEU Vulnerability Assessment will depend on site-specific plans. Because of the need to work with separate Field Offices, scheduling and tracking of PIs concerning the other 100 vulnerabilities will take more effort and time to perform than those explicitly covered in the HEU Management Plan.

This page intentionally left blank.

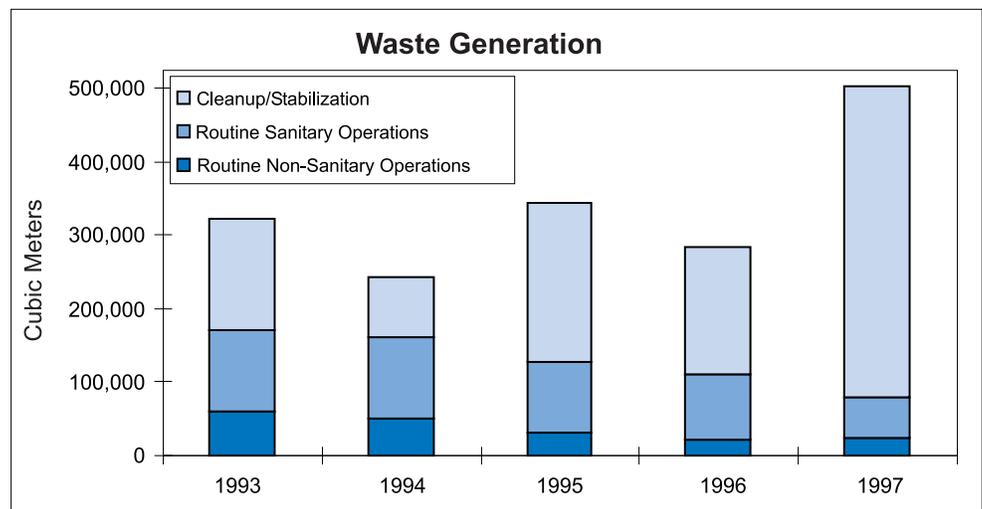
Indicator | **21. Waste Generation**

Definition

Total amount of waste generated, in cubic meters, for all DOE sites. Generated waste types include: High-Level Radioactive, Transuranic, Low-Level Radioactive, Low-Level Mixed Hazardous, and Sanitary. These waste types are generated during routine operations or cleanup/stabilization activities.

Routine operations waste consists of normal operations waste produced by any type of production operation; analytical and/or research and development laboratory operations, treatment, storage and disposal operations; "work for others;" or any other periodic or recurring work that is considered ongoing in nature.

Cleanup/stabilization waste, including primary and secondary waste, is generated by the environmental restoration of contaminated media (soil, groundwater, surface water, sediments, etc.), stabilization of nuclear and non-nuclear (chemical) materials, and deactivation and decommissioning of facilities.



Source: Office of Pollution Prevention, Office of Environmental Management, Annual Report of Waste Generation and Pollution Prevention Progress 1997.

Key Observations

- DOE has achieved its Complex-Wide Waste Reduction Goals for routine operations based upon a comparison of 1997 waste generation to the 1993 baseline. However, it is important to note that increases in low-level radioactive waste generation could reverse this achievement.
- Excluding sanitary waste, routine operations waste generation increased three percent from 1996 to 1997, and decreased 61 percent overall from 1993 to 1997.
- In 1997, the DOE Complex generated approximately 503,700 cubic meters of waste. Most of the Complex's waste was generated by cleanup/stabilization activities (84%).
- Waste from cleanup/stabilization activities increased 147 percent from 1996 to 1997 due to contaminated soil removal and disposal, and decommissioning activities.

The tables below subcategorize waste generation based on production source: routine or cleanup/stabilization activities.

The tables below subcategorize waste generation based on production source: routine or cleanup/stabilization activities.

Additional Analysis

**Waste Generated During Routine Activities
(cubic meters)**

Waste Type	1993	1994	1995	1996	1997
High-Level Radioactive	1,708	2,071	2,496	2,670	1,994
Transuranic	709	546	339	302	267
Low-Level Radioactive	40,856	31,868	21,896	15,053	16,533
Low-Level Mixed	3,331	3,133	1,338	1,371	1,373
Hazardous	12,430	12,507	4,103	3,063	2,880
Total excluding Sanitary Waste	59,034	50,125	30,172	22,459	23,047
Sanitary*	112,386	110,305	96,891	88,939	55,590
Grand Total	171,420	160,430	127,063	111,398	78,637

- High-level and transuranic waste accounted for less than three percent of the Complex-wide waste generated during routine activities.
- Sanitary waste constituted 71 percent of the total waste generated during routine activities.

**Waste Generated During Cleanup/Stabilization Activities
(cubic meters)**

Waste Type	1993	1994	1995	1996	1997
High Level Radioactive	0	0	0	0	0
Transuranic	458	214	156	202	119
Low-Level Radioactive	88,161	42,604	86,847	64,971	326,574
Low-Level Mixed	45,333	14,039	4,616	2,132	2,168
Hazardous	31,029	8,900	22,679	29,901	12,747
Total excluding Sanitary Waste	124,181	65,757	114,298	97,206	341,608
Sanitary	26,222	16,010	103,027	74,982	83,481
Grand Total	150,403	81,767	217,325	172,188	425,089

- From 1996 to 1997, low-level radioactive waste generated from cleanup/stabilization activities increased due to contaminated soil removal and disposal at the Hanford Site, and two environmental restoration projects with large soil excavations at the Mound Plant.
- Sanitary waste increased due to decommissioning activities at the Idaho National Engineering and Environmental Laboratory, and increased excavation at the Oak Ridge Y-12 Plant's Lower East Fork Poplar Creek.

Indicator

22. Integrated Safety Management System Implementation Status

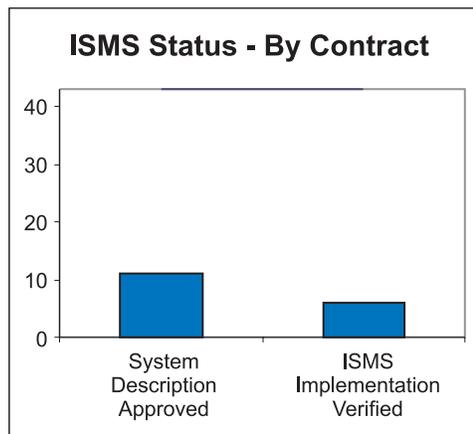
Definition

Integrated Safety Management (ISM) addresses the systematic process of ensuring the integration of all elements of environment, safety, and health (ES&H) into one ES&H system, with a focus on accomplishing work safely. All DOE sites are to have verified ISM systems in place by September 2000.

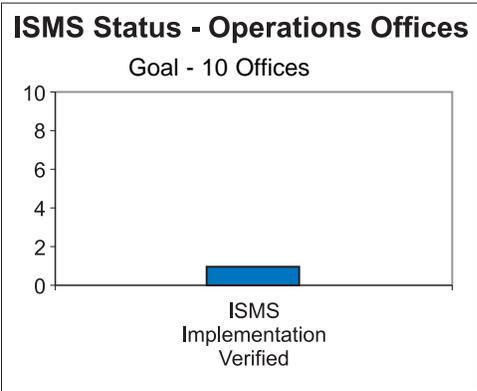
For the purpose of this PI, ISMS implementation will be tracked throughout the Department of Energy complex by "Contract" and by "Operations Office", rather than by site. Some sites may have more than one contract, with several facilities applicable to a given contract. To track by Contract, 41 data points were established, with each data point representing one contract; in addition, two Government-Owned Government-Operated (GOGO) facilities are being tracked for a total of 43 data points. It is recognized that contracts may not be equal in complexity and level of effort based on the number, nature of hazards, and type of facilities involved. For a more detailed tracking of site/facilities implementation, refer to: http://www.eh.doe.gov/ism/scheds/10_FACLST.pdf

For each contract, two items will be tracked and reported. These items are "System Description Approved" and "ISMS Implementation Verified." The Systems Description Approved column on the "ISMS Status – By Contract" chart, implies that a respective contractor has submitted a description of its safety management system that conforms to the guidance on preparation and content provided to them, and has been approved by the DOE Approval Authority. The ISMS Implementation Verified column on the same chart, implies that the contractor's safety management system conforms to the requirements of the approved ISMS description that was submitted, and has been verified as such. For Operations Office tracking, shown on the "ISMS Status – Operations" chart, only the "ISMS Implementation Verified" will be tracked since Operations Offices are not required to submit "System Descriptions" for approval.

In the case of a contract in which several facilities are involved, the respective contract would not be shown as having its "ISMS Description" approved, or its "ISMS Implementation Verified" until all applicable facilities have achieved their respective "approval" and verification "completed."



Source: DOE Safety Management Implementation Team



Source: DOE Safety Management Implementation Team

- Of the 10 "Priority Facilities" identified by DOE in its ISMS implementation plan, six have implemented their ISMS. For the four remaining, two are scheduled for implementation in the first quarter of 1999, one the second quarter, and one the third quarter.

Key Observations

Site Highlights: Hanford

Hanford Site Performance Report

- Each month, a Hanford Site Performance Report is produced that addresses three contractors, as well as the Department of Energy's Richland Operations Office (RL). The three contractors are: Fluor Daniel Hanford, Inc. (FDH) (Project Hanford Management Contract (PHMC)); Bechtel Hanford, Inc. (Environmental Restoration Contract (ERC)); and, Pacific Northwest National Laboratories (PNNL).
- The report provides monthly status applicable to: Funds Management Control, Environmental (restoration, waste management, tank waste remediation), Spent Nuclear Fuels, Advanced Reactor Transition Project, Science and Technology, and Safety and Health. The complete monthly report may be viewed at: <http://www.hanford.gov/hspr/>.
- Performance reports are used by DOE-RL and Hanford contractor management, but more specifically they are used by the President's and Employee Zero Accident Councils.
- The President's Council has membership representing labor, management (particularly the PHMC Presidents), and employees. Its responsibilities include developing clear and specific performance-based safety and health goals and activity objectives, as well as present Project Hanford safety performance indicator updates on a monthly basis.
- The Employee Zero Accident Councils, as part of their responsibility to communicate and promote worker involvement in safety and health, review accident and near miss incident data to identify trends.

Safety and Health Indicators

Seven safety and health indicators are included in the report:

- Total OSHA Recordable Case Rate (Example shown in Figure 1)
- OSHA Recordable Cases by Project (Example shown in Figure 2)
- Occupational Illness & Injury Cases/Day
- OSHA Lost / Restricted Workday Case Rate
- Lost/Restricted Workday Rate (Severity Rate)
- First Aid Case Rate
- Radiological Events

Facility Evaluation Board Table

- Figure 3 depicts the quantitative results of monthly facility inspections that address ten functional areas, three of which are: Radiation Control, Environment, and Occupational Safety and Health.
- A score of 1 to 5 is assigned to each functional area, for each facility, with the last column of the table providing an overall score, across all categories.

Hanford's Performance Indicator Forum and Trending Directory

- A group called the Performance Indicator Forum meets monthly to allow open discussion and training related to analysis and use of performance indicators.
- A document referred to as the Trending Directory provides performance indicator information related to: trending; statistical process control; specific chart types (control charts, histograms, Pareto); and, implementing performance measures. The directory can be viewed at: <http://www.hanford.gov/safety/vpp/trend.htm>.

Positive Results from Hanford's Performance Reporting Process

Hanford indicates that the following positive actions have resulted from the Performance Reporting Process.

- Established a focal point for discussion with the Office of the Presidents of the four major contractors.
- Active employee participation has achieved a greater level of ownership by employees.
- Provided a more effective path for resolution of below expectation performance.
- Reinforced the positive change in Safety Culture.
- Provided timely feedback on performance.
- Provided a more focused approach for the development and measurement of new initiatives.

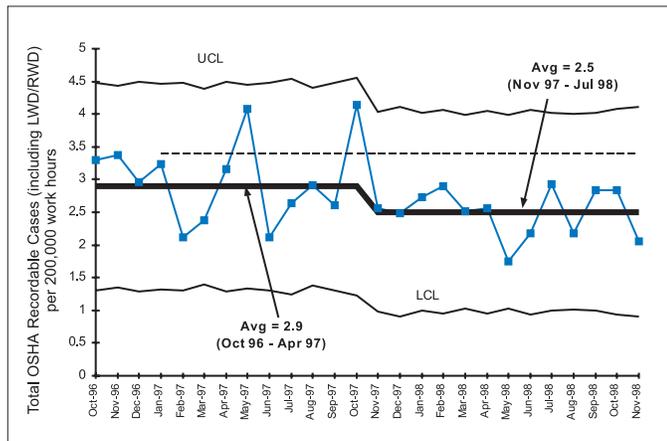


Figure 1. Total OSHA Recordable Case Rate

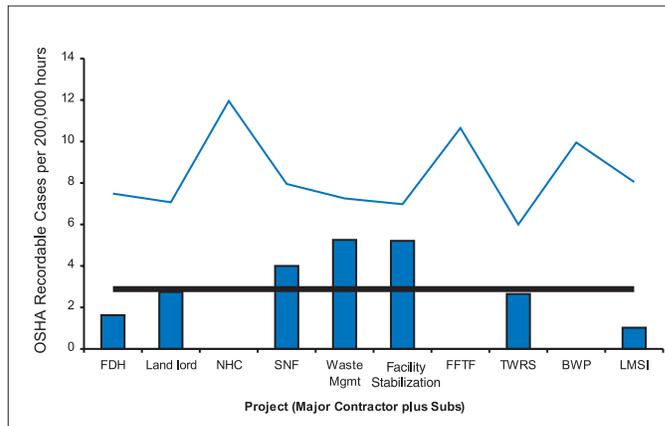


Figure 2. OSHA Recordable Case Rate

HANFORD SITE PERFORMANCE REPORT		PHMC FACILITY EVALUATION BOARD							NOVEMBER 1998			
Date	Facility	RADCON	EMERG PREP	TRAINING	OPS	QA	FAC ADMIN & ORG	MAINT	ENG	ENV	OS&H	Overall
Mar-96	FFTF	2	3	4	2	3	3	3	3	2	2	2
May-96	300 LEF	4	4	4	3	4	4	4	4	4	4	4
Jul-96	West TF	4	3	3	3	4	3	3	3	4	4	4
Oct-96	Utilities	NA	4	3	3	3	4	4	3	2	4	4
Nov-96	K-Basins	2	3	3	3	4	2	3	3	3	3	3
Dec-96	SWP/T-Plant	3	4	4	3	4	4	4	3	3	3	4
1996	AVERAGE	3.0	3.5	3.5	2.8	3.7	3.3	3.5	3.2	3.0	3.3	3.5
Jan-97	B Plant/WESF	4	2	4	3	4	3	3	3	2	2	3
Mar-97	East TF/CP	4	3	2	3	4	3	3	3	3	2	3
May-97	300 LEF	4	4	4	2	3	2	2	3	2	2	3
Jun-97	200 LWPF	4	4	3	4	4	4	3	3	4	3	4
Aug-97	PFP	5	5	4	3	4	4	3	3	3	4	4
Sep-97	222S/WSCF	4	4	5	3	3	4	3	3	3	3	3
Nov-97	SST	3	3	2	3	3	3	3	3	2	2	3
Dec-97	324/327	3	4	4	3	5	3	3	4	4	3	4
1997	AVERAGE	3.9	3.6	3.5	3.0	3.8	3.3	2.9	3.1	2.9	2.6	3.4
Jan-98	SWP	3	3	4	3	3	3	3	3	3	2	3
Mar-98	DST/CP	4	3	2	4	3	3	3	3	3	2	3
Apr-98	WESF	4	3	3	3	3	3	3	3	3	3	3
May-98	DynCorp	5	4	4	4	4	4	3	3	3	4	4
May-98	200 LWPF	3	3	3	3	2	2	2	2	2	2	3
May-98	300 LEF	2	3	3	2	2	2	2	2	2	1	2
Jun-98	SNF	3	3	3	3	4	3	4	4	4	4	4
Aug-98	FFTF	2	2	2	2	2	2	2	2	2	2	2
1998	AVERAGE	3.3	3.0	3.0	3.0	2.9	2.8	2.8	2.8	2.8	2.5	3.0

Scoring Criteria:

- 1 - Excellent
- 2 - Meets Expectations
- 3 - Meets Minimum Requirements
- 4 - Below Expectations
- 5 - Significantly Below Expectations

Figure 3. Results of Monthly Facility Inspections

This page intentionally left blank.

The Secretary's Commitments to the President in EQ and ES&H (for FY98)

Environmental Quality (EQ) and Environment, Safety, and Health (ES&H) commitments as part of the Secretary of Energy's Performance Agreement with the President for Fiscal Year 1998 are summarized below.

More information related to the status of these commitments can be obtained from DOE's Office of Policy or via the World Wide Web at: http://www.doe.gov/policy/library/sol98/goals_eq.htm. Status is defined as follows:

- Fully Successful – meeting or exceeding target
- Successful – effectively meeting 80-100% of target
- Partially Successful – effectively meeting 50-80% of target
- Unsuccessful – effectively meeting less than 50% of target

Environmental Quality (FY98)

Aggressively clean up the environmental legacy of nuclear weapons and civilian nuclear research and development programs, minimize future waste generation, safely manage nuclear materials, and permanently dispose of the Nation's radioactive wastes.

Our Commitments

EQ1: Reduce the most serious risks from the environmental legacy of the U.S. nuclear weapons complex first.

STATUS: Partially Successful

EQ1-1 Reducing Worker, Public, and Environmental Risks

Identify and fund projects to reduce the most serious risks first and prevent further increases in relative risk at all sites. **(EM)**

Success will be measured in FY 1998 by:

- *Stabilizing and safely storing about 3.7 metric tons of heavy metal of spent nuclear fuel (SNF). [Note: SNF data excludes information that is controlled or classified.]*
- *Stabilizing approximately 20,000 kilograms of bulk plutonium residue and approximately 7,000 liters of plutonium solution, and safely storing stabilized material.*
- *Closing one high-level waste storage tank at the Savannah River Site.*

EQ2: Clean up as many as possible of the Department's 53 remaining contaminated geographic sites by 2006.

STATUS: Successful

EQ2-1 Accelerate and Complete Geographic Site Cleanup

Clean up as many as possible of the Department's 53 remaining contaminated geographic sites by 2006. Accelerate and complete cleanup of 9 large geographic sites by 2006, including the Fernald Environmental Management Project, Mound Plant, Rocky Flats Environmental Technology Site, Portsmouth Gaseous Diffusion

Plant, West Valley Site, Weldon Spring Site, Brookhaven National Laboratory, and Lawrence Livermore National Laboratory (Main Site and Site 300).

Cleanup 34 of the remaining 36 smaller geographic sites by 2006, including the Uranium Mill Tailings Remedial Action (UMTRA) Project.

Accelerate cleanup at the remaining 7 large sites (Hanford, Savannah River, Idaho, Oak Ridge Reservation, Los Alamos National Laboratory, Nevada Test Site, and Paducah) where overall completion will not be achieved by 2006, and ramp up disposal operations at the Waste Isolation Pilot Plant (WIPP) to facilitate this accelerated clean-up.

Remediation progress will be measured by completion of release sites (i.e., discrete areas of contamination) and facilities (i.e., contaminated structures) that will ultimately lead to the completion of the entire geographic site. **(EM)**

Success will be measured in FY 1998 by:

- *Completing remediation at 6 geographic sites. This will bring the total number of completed geographic sites to 66 out of a total of 113 contaminated geographic sites.*
- *Making progress on release site completion:*
 - *Completing about 575 release site assessments.*
 - *Completing about 280 release site cleanups. This will bring the number of completed release site cleanups to approximately 4,130 out of a total inventory of about 9,300 release sites.*
- *Making progress on facility decommissionings:*
 - *Completing about 90 facility decommissioning assessments.*
 - *Completing about 70 facility decommissionings. This will bring the number of completed facility decommissionings to approximately 520 out of a total inventory of about 2,950 facilities.*

EQ3: Safely and expeditiously dispose of waste generated by nuclear weapons and civilian nuclear research and development programs and make defense high-level radioactive wastes disposal-ready.

EQ3-1 Opening the Waste Isolation Pilot Plant

STATUS: Partially Successful

Declare the Waste Isolation Pilot Plant (WIPP) geologic repository open for disposal of transuranic wastes in May 1998 (subject to regulatory approval) and maximize timely shipment of waste from DOE sites. **(EM)**

Success will be measured in FY 1998 by shipping between 388 and 592 cubic meters of transuranic (TRU) waste to WIPP for disposal from three DOE sites (Los Alamos National Laboratory, Rocky Flats Environmental Technology Site, and Idaho National Engineering and Environmental Laboratory).

EQ3-2 Making Disposal Ready and Disposing of Waste Generated During Past and Current DOE Activities

STATUS: Fully Successful

Safely and expeditiously make disposal-ready and dispose of waste generated during past and current DOE activities. **(EM)**

Success will be measured in FY 1998 by:

- Disposing of about 4,000 cubic meters of mixed low-level waste (MLLW).
- Disposing of about 30,000 cubic meters of low-level waste (LLW).
- Producing 200 canisters of high-level waste (HLW) at the Defense Waste Processing Facility (DWPF) at the Savannah River Site.
- Producing approximately 88 canisters of HLW at the West Valley Demonstration Project.

EQ-4 Prevent future pollution.

STATUS: Fully Successful

EQ4-1 Preventing Future Pollution

Incorporate pollution prevention, including waste minimization, recycling, and reuse of materials, into all DOE activities. **(EM, DP, NE, ER)**

Success will be measured in FY 1998 by:

- Reducing routine waste generation by 40 percent compared with 1993 waste generation rates. [Data for reporting will be available at the end of calendar year 1998] **(EM)**
- Reducing/avoiding the generation of radioactive, mixed, and hazardous wastes by about 4,000 cubic meters. [Data for reporting will be available at the end of calendar year 1998] **(EM)**

EQ5: Dispose of high-level radioactive waste and spent nuclear fuel in accordance with the Nuclear Waste Policy Act as amended.

STATUS: Fully Successful

EQ5-1 Continuing with Yucca Mountain Site Characterization

Complete the scientific and technical analyses of the Yucca Mountain site, and if it is determined to be suitable for a geologic repository, obtain a license from the Nuclear Regulatory Commission. **(RW)**

Success will be measured in FY 1998 by completing the viability assessment analyses for licensing and constructing a geologic repository at the Yucca Mountain site. The assessment will consist of four key components:

- A design and operational concept of the repository;
- An assessment of the performance of that concept in the geologic setting;
- A plan and cost estimate to construct and operate the repository; and
- A plan and an estimate of the costs to complete a license application.

STATUS: Fully Successful

EQ5-2 Developing Waste Acceptance and Transportation Capability

Maintain the capability to respond to potential statutory direction that may include transportation of spent nuclear fuel and high-level waste to a designated interim storage facility. **(RW)**

Success will be measured in FY 1998 by:

- *Completing generic, non-site-specific interim storage facility work and addressing long lead-time issues related to storage of waste including design, engineering, and safety analyses.*
- *Developing a market-driven approach that uses private sector management and operational capabilities to provide waste acceptance and transportation services. Issuing a revised draft request for proposals.*
- *Completing a revised Policy and Procedure for implementation of Section 180(c) of the Nuclear Waste Policy Act.*

EQ-6 Reduce the life-cycle costs of environmental cleanup.

EQ6-1 Reducing Environmental Cleanup Costs through Enhanced Performance

STATUS: Successful

Significantly enhance performance, increase efficiency, and reduce costs through increased use of fixed-price competitive contracting, optimized project sequencing, recycling, and other waste minimization techniques, privatization, systems engineering, and benchmarking. **(EM)**

Success will be measured in FY 1998 by

- *Achieving productivity enhancement targets (Targets to be established as part of the Accelerating Clean-up: Focus on 2006).*
- *Increasing the dollar value and/or number of competitively awarded fixed-price contracts, including privatization contracts. Continuing the development of the privatization strategy by:*
 - *Awarding the Oak Ridge Transuranic Waste Treatment Privatization contract;*
 - *Authorizing commencement of the Tank Waste Remediation System (TWRS) contract Phase 1B at Hanford Site in Washington; and*
 - *Awarding the Carlsbad Area Office Contact-Handled Transuranic Waste Transportation Privatization Contract.*

EQ6-2 Developing and Deploying Innovative Cleanup Technologies

STATUS: Fully Successful

Develop and deploy innovative environmental cleanup, nuclear waste, and spent fuel treatment technologies that reduce cost, resolve currently intractable problems, and/or are more protective of workers and the environment. **(EM)**

Success will be measured in FY 1998 by:

- *Accomplishing 49 innovative technology deployments.*
- *Demonstrating 35 alternative technology systems that meet the performance-specification based needs as identified by the Site Technology Coordinating Groups (STCGs).*
- *Making 40 alternative technology systems available for implementation with full cost and engineering performance data.*
- *Completing the final Programmatic Environmental Impact Statement for selecting the long-term management strategy for the depleted UF₆. **(NE)***

STATUS: Fully Successful

EQ6-3 Completing Deactivation of Surplus Facilities

Reduce operating costs by completing deactivation of surplus facilities and placing them in a safe and environmentally sound condition, requiring minimal surveillance and maintenance. **(EM)**

Success will be measured in FY 1998 by completing about 60 surplus facility deactivations.

EQ-7 Maximize the beneficial reuse of land and effectively control risks from residual contamination.

STATUS: Successful

EQ7-1 Making DOE Lands and Facilities Available for Other Uses

In conjunction with stakeholders, develop comprehensive land use plans for DOE sites that provide information on alternative uses, ownership, environmental requirements, and implementation schedules. **(FM)**

Success will be measured in FY 1998 by:

- *Submitting to Congress a future use plan for DOE sites, and an analysis of related long-term stewardship issues by October 1998. The plan and analysis will include the Hanford Site, Savannah River Site, Rocky Flats Environmental Technology Site, and Idaho National Engineering and Environmental Laboratory. **(EM)***
- *Initiating mission justification analysis and providing a schedule for reporting on the amount of excess land and facilities at each site by July 30, 1998.*

Environment, Safety, and Health

The mission of the Office of Environment, Safety, and Health is to develop innovative, unique, and cost-effective approaches for the protection of Department of Energy workers, the public, and the environment.

Our Commitments

STATUS: Fully Successful

CM1-1 Instituting a Sound ES&H Culture

Integrate and embed risk-based outcome oriented environment, safety, and health (ES&H) management practices into the performance of DOE's day-to-day work. **(EH)**

Success will be measured in FY 1998 by:

- *Preventing fatalities, serious accidents, and environmental releases at Departmental sites.*
- *Initiating Integrated Safety Management Systems at all 10 high priority facilities by April 1998.*
- *Completing documentation of ES&H roles and responsibilities for all appropriate DOE offices and sites by July 1998.*
- *Publishing guidance for incorporating environmental justice principles into the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) implementation process. (EH/ED)*
- *Through independent oversight, provide information and analysis of the*

effectiveness, vulnerabilities, and trends of the Department's environment, safety, health, and safeguards and security policies and programs to the Secretary and senior line management

- *Completing an additional four needs assessments to continue building the basis for a more detailed program of medical surveillance, in order to address the health risks to former DOE workers.*

CM1-2 Ensuring DOE Programs Appropriately Address ES&H Priorities

Clearly identify and fund ES&H priorities and ensure resources are appropriately spent on those priorities. **(EH)**

Success will be measured in FY 1998 by beginning to annually monitor and report on ES&H expenditures and improve related internal controls.

STATUS: Fully Successful

CM1-4 Investigating Feasibility of Independent External Oversight of Safety and Health at DOE Sites

Work with the Nuclear Regulatory Commission and the Occupational Safety and Health Administration to evaluate the costs and benefits of independent external regulation of safety and health. **(EH)**

Success will be measured in FY 1998 by conducting three NRC/DOE pilot projects to assess the DOE facilities against the standards that NRC believes would be appropriate to ensure radiological safety.

STATUS: Fully Successful

Relationship to DOE Strategic Plan Goals

Establish Priorities &
Eliminate Hazards

DOE STRATEGIC PLAN (September 1997)	PERFORMANCE INDICATORS
<p>DOE's Four Businesses: Environmental Quality <i>How we will reduce the environmental, safety, and health risks and threats from DOE facilities and materials, safely and permanently dispose of civilian spent nuclear fuel and defense related radioactive waste, and develop the technologies and institutions required for solving domestic and international environmental problems.</i></p> <p>Environmental Quality: Objective 3 <i>Safely and expeditiously dispose of waste generated by nuclear weapons and civilian nuclear research and development programs and make defense high-level radioactive waste disposal-ready</i></p>	<ol style="list-style-type: none"> 1. Total Recordable Case Rate 2. Occupational Safety and Health Cost Index 3. Electrical Safety 4. Industrial Operations Safety 5. Chemical Hazard Events 6. Reportable Occurrences of Releases to the Environment 7. Cited Environmental Violations 8. Environmental Permit Exceedances 9. Radiation Dose to the Public 10. Worker Radiation Dose 11. Radiological Events 18. Price-Anderson Amendments Act Enforcement 19. Spent Nuclear Fuel and Plutonium Vulnerabilities Resolved 20. HEU Vulnerabilities Resolved 21. Waste Generation
<p>Corporate Management: Environment, Safety, and Health <i>How we will ensure the safety and health of workers and the public, and protect and restore the environment.</i></p> <p>Corporate Management: Objective 1 <i>Ensure the safety and health of the DOE workforce and members of the public, and the protection of the environment in all Departmental activities.</i></p>	<ol style="list-style-type: none"> 1. Total Recordable Case Rate 2. Occupational Safety and Health Cost Index 3. Electrical Safety 4. Industrial Operations Safety 7. Cited Environmental Violations 8. Environmental Permit Exceedances 9. Radiation Dose to the Public 10. Worker Radiation Dose 11. Radiological Events 12. Near Misses and Safety Concerns 13. Inadequate Procedures/Procedures Not Followed 16. Environmental Compliance Milestones Met 17. Open DNFSB Recommendations 22. Integrated Safety Management System Implementation Status

Performance Requirements

This page intentionally left blank.

Summary of Process

B1. Overview

One of the critical success factors identified in the Department of Energy's (DOE) Strategic Plan for environment, safety and health is, "how will we ensure the safety and health of workers and the public, and protect and restore the environment." This report describes a new approach for measuring the performance of DOE operations in these areas and thereby supporting management decisions aimed at "ensuring the safety." The general concept is to focus on key factors with the most impact on worker and facility safety and the environment.

Data collection was limited to available data (e.g., ORPS, CAIRS, Site Environmental Reports). The process was non-intrusive and did not expend site resources. As such, the performance indicator components may not sufficiently measure all facets of environment, safety and health. Experience from this report, along with customer feedback from the attached survey form, will be evaluated.

This report was reviewed by a multi-disciplinary team with expertise in nuclear and facility safety, environment, worker safety and health, health studies, and planning/administration. The team is identified at the end of this appendix.

Summary of Process

1. Overview

1.1 Initial Performance Measures

2. Data Analysis - Analyses Performed

3. Significance Analysis

B1.1 Initial Performance Indicators

The performance indicators included in this report are identified in the following table. Selection of the indicators involved both evaluation of the overall safety significance as well as tests of availability. A process was established where all potential indicators were evaluated with respect to significance to the ultimate goal of measuring performance in environment, safety and health. With respect to availability, a decision was made to select indicators from existing data streams to avoid, for now, levying a burden on field activities for additional data. Primarily, indicators are derived from data within four data systems and one annual report:

- *Occurrence Reporting and Processing System (ORPS)*—A system originally designed for notification of nuclear as well as non-nuclear occurrences in the field. For all indicators based on occurrence reports, data prior to 93Q1 has been removed from the graphs and analysis.
- *Computerized Accident/Incident Reporting System (CAIRS)*—A system for collecting data associated with occupational injury and illness events and statistics.
- *Radiation Exposure Monitoring System (REMS)*—A system for collecting data on individual radiation doses received by DOE complex workers.
- *Environmental Compliance Database*—A system maintained by the Office of Environmental Policy and Assistance.
- *Annual Site Environmental Reports*

There are, of course, limitations resulting from using the data for other than the purpose for which it was collected. Furthermore, the availability of data should not be confused with relevance to measuring performance. Indicators should be selected based on their impact on the operations being examined, not solely because the data exist. Although some of the selected indicators may be of interest to other audiences, it is likely that other valid indicators exist that should be analyzed and trended to provide the appropriate perspective (e.g., facility, contractor, program management) on performance.

PI Component	Data Source
I. Accidents/Events	
1. Total Recordable Case Rate	Computerized Accident/Incident Reporting System/ EH-51
2. Occupational Safety and Health Cost Index	Computerized Accident/Incident Reporting System/ EH-51
3. Electrical Safety	Review of Occurrence Reports, EH-33 Field Office Contacts
4. Industrial Operations Safety	Review of Occurrence Reports, EH-33 Field Office Contacts
5. Chemical Hazard Events	Quarterly Review of Chemical Safety Concerns/ Occurrence Reporting and Processing System, EH-52/EH-53/BNL
6. Reportable Occurrences of Releases to the Environment	Review of Occurrence Reports, EH-33
7. Cited Environmental Violations	Environmental Compliance Tracking Database, EH-41
8. Environmental Permit Exceedances	Annual Site Environmental Reports, EH-41
9. Radiation Dose to the Public	Annual Reports to Environmental Protection Agency (EPA) by Each Site, EH-41
10. Worker Radiation Dose	Radiation Exposure Monitoring System (REMS), EH-52
11. Radiological Events	Review of Occurrence Reports, EH-33
II. Precursors	
12. Near Misses and Safety Concerns	Review of Occurrence Reports, EH-33
13. Inadequate Procedures/Procedures Not Followed	Review of Occurrence Reports, EH-33
14. Safety System Actuations	Review of Occurrence Reports, EH-33
15. Safety Equipment Degradation	Review of Occurrence Reports, EH-33, Field Office Contacts
III. ES&H Management	
16. Environmental Compliance Milestones Met	EM Progress Tracking System (PTS), EH-41
17. Open DNFSB Recommendations	Safety Issues Management System (SIMS), S-3.1
18. Price-Anderson Amendments Act Enforcement	Office of Enforcement and Investigation Database, EH-10
22. ISMS Implementation Status	DOE Safety Management Implementation Team
IV. Hazards	
19. Spent Nuclear Fuel and Plutonium Vulnerabilities Resolved	Plutonium Vulnerability Management Summary Report, EM-66; Reports on Status of Corrective Actions to Resolve Spent Nuclear Fuel Vulnerabilities, EM-67
20. HEU Vulnerabilities Resolved	Office of Site Operations, DP-24 Highly Enriched Uranium ES&H Vulnerabilities Status Report, RFFO Field Office Contacts
21. Waste Generation	Waste Minimization Reporting System, EH-41

B2. Data Analysis—Analyses Performed

The data analysis results are summarized in the DOE Performance Indicator Report. They are intended to identify areas which should be further investigated (to identify areas that may require intervention as well as good practices to share across DOE); they do not provide absolute answers in themselves. Data analyses include:

- Looking for statistically significant trends over time,
- Comparison to historical averages or benchmarks (e.g., Bureau of Labor Statistics for similar industries),
- Normalization of events to opportunities (e.g., construction related events divided by construction hours worked or construction dollars spent),
- Examination for statistically significant trends in types of operations, severity or type of events, and causes.

Typically, the historical baseline is established using existing data excluding the most recent quarter. Where possible, data were analyzed by quarter. In some cases, data were also viewed monthly to reveal any interesting seasonal effects not evident in the quarterly data grouping. Where appropriate, sites were contacted to provide perspective for unusual data values or trends. Data sources for several of these measures are annual; the need for more frequent data must be evaluated for future reports.

The data can also be used to perform other special analyses and reports (such as trends in causes and types of events). These analyses and reports could support special needs, such as oversight preparation and programmatic reviews. Root cause data is analyzed based on information from the preceding quarter as there is an inherent time lag between event notification and final identification of a root cause. To capture the maximum number of root causes for analysis purposes, the preceding quarter is examined.

B3 – Significance Analysis

The application of significance ranking in the context of performance indicators can be used to aid DOE and contractor management in determining where they need to apply resources to mitigate hazards or to improve safety. It is anticipated that as experience is gained, significance ranking will be applied to other performance indicators.

Significance of events is assigned in accordance with Table 1, EH-33 Performance Indicator Significance Criteria, in Appendix B-3 of this report. The table was developed for use with the PI report with input from various significance ranking models, including Savannah River's Significance Categories Matrix, Hanford's Priority Planning Grid, and from limits provided by various DOE Orders.

There are four significance rankings – Level 1 through 4 – with Level 1 being the most significant and Level 4 the least. Generic criteria for areas such as worker and public safety are combined with PI-specific criteria (i.e., Electrical Safety) to rank the significance of events. For example, a minor event that would be ranked as Level 4 (least significant) under the generic criteria would, in accordance with the PI-specific criteria for Electrical Safety, be ranked as Level 3 if an electrical shock was involved. For cases where there is no PI-specific criteria, the generic criteria are used.

It is expected that more PI-specific criteria will be developed as experience is gained with the current system and based on feedback from readers of this report.

Table 1 - EH-33 Performance Indicator Significance Criteria

Worker Safety	Level 1	Level 2	Level 3	Level 4
	Loss of life			
	Permanent disability			
	Injury with >30 days of lost work time	Injury with hospitalization or lost work time	Injury requiring medical treatment	Minor injury - no treatment, no lost work days
Public Safety	Level 1	Level 2	Level 3	Level 4
	Offsite exposure near or above limits, moderate injuries	Low-level radiation or chemical exposure	Minor injury	Public inconvenience
Environmental	Level 1	Level 2	Level 3	Level 4
	Major on-site environmental damage with cleanup costs >\$5M	On-site environmental damage with cleanup costs >\$500K	On-site environmental damage with cleanup costs >\$250K	Reportable release with minor or no impact
	Off-site environmental damage with significant cleanup costs	On-site environmental damage with minor cleanup costs	Release to environment that exceed regulatory limits	
Facility Safety	Level 1	Level 2	Level 3	Level 4
	Willful management disregard or direction to staff to disregard safety requirements, policies, or procedures	Widespread failure or lack of one or more facility safety programs	Findings indicating major deficiency or lack of compliance with safety documents	Administrative or isolated non-compliance
		Unreviewed Safety Question	OSR / Tech Spec violation	
		Major loss of configuration control in nuclear facility	Technical analysis cannot support conclusions needed for compliance document	
		DOE authorization required for startup or restart	Failure of corrective action to prevent recurrence	
External Compliance	Level 1	Level 2	Level 3	Level 4
	Willful violation of federal, state, or local laws or regulations	Several instances of non-compliance that indicate major deficiency or lack of a compliance program	Isolated or single noncompliance	Administrative or isolated non-compliance
Cost / Schedule	Level 1	Level 2	Level 3	Level 4
Cost	>\$5M	>\$1M	>\$250K	>\$100K
Schedule	Significant project delay		Minor project delay	Failure to meet milestone
Electrical Safety	Level 1	Level 2	Level 3	Level 4
			Electrical Shock, RF burn	
			Contact with energized equipment that should have been de-energized	

Authors

US DOE, Office of Environment, Safety and Health

Richard Day, Office of Operating Experience Analysis and Feedback, EH-33

Steven Woodbury, Office of Environmental Policy and Assistance, EH-41

Janet Macon, Office of Occupational Safety and Health Policy, EH-51

Frank Cicchetto, Office of Operating Experience Analysis and Feedback,
EH-33/Parallax, Inc.

Todd Lapointe, Office of Operating Experience Analysis and Feedback, EH-33/
Parallax, Inc.

Kenneth Malnar, Office of Operating Experience Analysis and Feedback,
EH-33/Parallax, Inc.

Keith Currin, Office of Operating Experience Analysis and Feedback,
EH-33/Parallax, Inc.

Contributors

US DOE, Office of Environment, Safety and Health

Ken Duvall, Office of Environmental Policy and Assistance, Air, Water and
Radiation Division, EH-412

Nirmala Rao, Office of Worker Protection Programs and Hazards Management,
EH-52

Helen Todosow, Brookhaven National Laboratory

Joe Arango, Office of the Departmental Representative to the DNFSB, S-3.1

David Compton, Office of the Departmental Representative to the DNFSB,
S-3.1/Vista Technology Corp.

Sue Petersen, Office of Enforcement and Investigation, EH-10

Hoyt Johnson, Office of Nuclear Material Stabilization, EM-66

Howard Eckert, Spent Fuel Management Office, EM-67

Pamela Curry, Office of Operating Experience Analysis and Feedback,
EH-33/Parallax, Inc.

Jimmy Myers, Office of Operating Experience Analysis and Feedback,
EH-33/Parallax, Inc.

Reviewers

US DOE, Office of Environment, Safety and Health

Tom Rollow, Office of Operating Experience Analysis and Feedback, EH-33

Earl Hughes, Office of Operating Experience Analysis and Feedback, EH-33

John Abeles, Office of Operating Experience Analysis and Feedback, EH-33/
Parallax, Inc.

Glossary

Baselines

Baselines provide an historical reference point used to show how the current period compares to past experience. Generally, historical baselines are established using existing data excluding the most recent reporting period. For the data that originates from CAIRS, the two most recent quarters are excluded to account for the lag in data reporting. Baselines established for data originating from occurrence reports are reevaluated each time the governing reporting order changes.

Causes of Occurrences

Causes of occurrences are determined by performing event investigations and may be identified as direct, contributing, or root causes.

- **Direct Cause:** The cause that directly resulted in the occurrence.
- **Contributing Causes:** The cause(s) that contributed to the occurrence, but by itself would not have caused the occurrence.
- **Root Cause:** The cause that, if corrected, would prevent recurrence of this and similar occurrences.

Cause categories are selected from the following:

1. **Equipment/material problem:** An event or condition resulting from the failure, malfunction, or deterioration of equipment or parts, including instruments or material.
2. **Procedure problem:** An event or condition that can be traced to the lack of a procedure, an error in a procedure, or procedural deficiency or inadequacy.
3. **Personnel error:** An event or condition due to an error, mistake or oversight. Personnel errors include inattention to details of the task, procedures not used or used incorrectly, communication problems, and other human errors.
4. **Design problem:** An event or condition that can be traced to a defect in design or other factors related to configuration, engineering, layout, tolerances, calculations, etc.
5. **Training deficiency:** An event or condition that can be traced to a lack of training or insufficient training to enable a person to perform a desired task adequately.
6. **Management problem:** An event or condition that can be directly traced to managerial actions or methods. Management problems include inadequate administrative control, work organization/planning deficiency, inadequate supervision, improper resource allocation, policies not adequately defined, disseminated or enforced,

The Cost Index is computed as follows:

$$\text{Cost Index} = 100 [(1,000,000) * D + (500,000) * T + (2,000) * LWC + (1,000) * WDL + (400) * WDLR + (2,000) * NFC] / \text{HRS}$$

where

D = the number of fatalities,

T = the number of permanent transfers or terminations due to occupational illness or injury,

LWC = the number of lost workday cases,

WDL = the number of days away from work

WDLR = the number of restricted workdays,

NFC = the number of non-fatal cases without days away from work or restricted workdays, and

HRS = the total hours worked.

Facility function identifies the type of facility or the activity/function performed by the facility. Possible facility functions are listed below.

- Plutonium Processing and Handling
- Special Nuclear Materials Storage
- Explosive
- Uranium Enrichment
- Uranium Conversion/Processing and Handling
- Irradiated Fissile Material Storage
- Reprocessing
- Nuclear Waste Operations
- Tritium Activities
- Fusion Activities
- Environmental Restoration Operations
- Category "A" Reactors
- Category "B" Reactors
- Solar Activities
- Fossil and Petroleum Reserves
- Accelerators
- Balance-of-Plant (e.g., offices, machine shops, site/outside utilities, safeguards/security, and transportation)

Cost Index Formula

Facility Function

**Occurrence Categories
(Types of Occurrences)**

The following terms are related to occurrence reporting, as required by DOE Order 232.1A, *Occurrence Reporting and Processing of Operations Information*.

Occurrence categories are arranged into 10 generic groups related to DOE operations and include the following:

1. Facility Condition
2. Environmental
3. Personnel Safety
4. Personnel Radiation Protection
5. Safeguards and Security
6. Transportation
7. Value Basis Reporting
8. Facility Status
9. Nuclear Explosive Safety
10. Cross-Category Items

**Price-Anderson
Amendments Act (PAAA)**

Price-Anderson Amendments Act (PAAA). The 1988 Price-Anderson Amendments Act extended indemnification to DOE operating contractors for consequences of a nuclear incident. At the same time, Congress required DOE to begin undertaking enforcement actions against those contractors who violate nuclear safety rules. The regulatory basis for the enforcement program is published in 10CFR820, Procedural Rules for DOE Nuclear Activities. Enforcement actions may include the issuance of Notices of Violations and, where appropriate, civil monetary penalties of up to \$100,000 per violation per day. The mechanism allows DOE to penalize a contractor for unsafe actions or conditions while providing positive incentives for contractors to strive for an enhanced nuclear safety culture through attention to compliance to standards and requirements, self-identification of problems, reporting noncompliance's to DOE and initiating timely and effective corrective actions.

Severity of Occurrence

Severity of occurrence indicates the degree of significance associated with the different types of occurrences.

- **Unusual Occurrence:** A non-emergency occurrence that exceeds the Off-Normal Occurrence threshold criteria; is related to safety, environment, health, security, or operations; and requires immediate notification to DOE.
- **Off-Normal Occurrence:** Abnormal or unplanned event or condition that adversely affects, potentially affects, or is indicative of degradation in the safety, safeguards and security, environmental or health protection, performance, or operation of a facility.

Statistical Process Control (SPC) is the application of statistical techniques to control a process.

TEDE = External Dose Contribution + Internal Dose Contribution. Prior to 1993, the method for calculating the internal dose contribution changed from an annual internal dose to a dose committed over 50 years. Although one may expect this change would result in higher reported doses, the elimination of the "legacy" doses from previous years' exposures resulted in lower reported doses.

Statistical Process Control (SPC)

Total Effective Dose Equivalent (TEDE)

Product Improvement Survey Form

Purpose of the Product - The Office of Operating Experience Analysis and Feedback, EH-33, developed this set of indicators for measuring the performance of DOE operations in the areas of Worker Safety and Health and the Environment. The indicators are intended to measure the Department's success in its strategic goal to manage and improve its environmental, safety, and health (ES&H) performance. The major customers for these indicators are expected to be the senior leadership of DOE.

In order to assess the effectiveness of this performance indicator report, we would appreciate your assistance by providing responses to the following (check one):

- | | | | | |
|---|--|-----|--------------------------|----|
| 1. Do you use indicators to measure performance? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 2. Do you feel that improved methods for measuring performance are needed? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 3. Would you make management decisions based on this kind of information? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 4. Does DOE-wide ES&H performance matter to you? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 5. What are your information needs with regard to measuring Department-wide ES&H success: | | | | |
| <input type="checkbox"/> | Moderate detail concerning the Department ES&H success | | | |
| <input type="checkbox"/> | Light detail concerning the Department ES&H success | | | |
| <input type="checkbox"/> | Quickpulse of the Department ES&H success | | | |
| <input type="checkbox"/> | I have no need for the information on a regular basis | | | |

Report Evaluation - From your review of this report, *and in consideration of the purpose stated above*, mark the number that most closely corresponds to your reaction to the following statements.

- | | | <i>Strongly
Agree</i> | | <i>Neutral</i> | | <i>Strongly
Disagree</i> |
|---|-----|---------------------------|-----|----------------|-----|------------------------------|
| 6. The performance indicators are relevant to the measurement of overall DOE ES&H performance. | (7) | (6) | (5) | (4) | (3) | (2) (1) |
| 7. The report layout (text and graphics) is logical and easy to understand. | (7) | (6) | (5) | (4) | (3) | (2) (1) |
| 8. The data presented in this report are consistent with my impressions of DOE's ES&H performance. | (7) | (6) | (5) | (4) | (3) | (2) (1) |
| 9. The performance indicators provide a "balanced" view (e.g., successes and problems) of DOE's ES&H performance. | (7) | (6) | (5) | (4) | (3) | (2) (1) |
| 10. This report helps measure DOE's success in managing and improving its ES&H performance. | (7) | (6) | (5) | (4) | (3) | (2) (1) |
| 11. This report is useful in communicating information on DOE's ES&H performance to external customers. | (7) | (6) | (5) | (4) | (3) | (2) (1) |

- | | | | | |
|--|--------------------------|-----|--------------------------|----|
| 12. Would you be willing to expend time/travel funds to participate in product improvement sessions? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |
| 13. Based upon your stated needs, does this report meet your expectations? | <input type="checkbox"/> | Yes | <input type="checkbox"/> | No |

Please fax completed survey form to Richard Day, EH-33, at 301-903-2329

